The American School and University

A YEARBOOK DEVOTED TO THE DESIGN, CONSTRUCTION, EQUIPMENT, UTILIZATION, AND MAINTENANCE OF EDUCATIONAL BUILDINGS AND GROUNDS

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SECTION I

PLANNING FOR COMMUNITY USE

THE COMMUNITY SCHOOL: A DEFINITION

By N. L. ENGELHARDT

Professor of Education, Teachers College, Columbia University

THE community school is not a stereotype. Its services coincide with the needs of the population center in which it is located. In no sense is it the traditional American school with its legacy of a curriculum pattern from the past or from other communities. The community school has developed out of community flaws brought to the fore by the depression. Democracy must rely in great degree upon local initiative. The community school must stimulate such initiative and capitalize local advantages and abilities. As Professor Evenden has well said, American education has gone through a series of changes that might be characterized as church-centered, teacher-centered, child-centered, and curriculum-centered schools. The economic and social trends of our nation point today to the need for community-centered schools.

Cities That Have Changed

Even in the short span of our country's life, many communities have come and gone. Industrial changes, wars, and the lure of promising livelihoods elsewhere, have tended to destroy or weaken American communities. Permanence is not an attribute of what man builds. Our giant cities have seemed to us to be built substantially upon rock, but one finds their nature changing rapidly because of man's thinking and man's action. Many thriving American communities have already disappeared from the scene. For example, most of us had little acquaintance with Gainesville, Ala., when it was a thriving city at the head of the Tombigby River. The Yankee merchant marine, then used as the chief means of transportation, was able to bring the products of the North to this interior point in the South. A Virginia mother and her son, who had just graduated from an eastern law school, visited a number of the promising young cities of the South and West to discover a place where he might hang out his shingle and begin his life's practice. After visiting, among others, Gainesville, St. Louis, and Chicago, the mother selected Gainesville as her first choice because she thought it would become the large metropolis of the South.

Today a few of the sea captains' homes imported from New England are still standing in Gainesville, and the population has been reduced to a mere handful. Gainesville, the metropolis, has disappeared. The descendants of its citizens have spread themselves among other promising centers to attain the goals of happiness and success for which every American strives. One wonders to what degree they are finding their communities adjusted to their needs, and to what degree the educational leaders of these new communities are assisting in maintaining these new centers of hope. Communities continue to grow only as human beings grow and make adjustments to the environmental conditions. Communities die where initiative is lacking and where the educational program suggests constantly that there are greener pastures elsewhere. Frequently the greenest pastures are right at home.

Even the giant cities of America present today serious problems associated with deterioration and decay. No mayor and no city council of our large cities is unaware of the threatening forces that are storming the citadels. In some cases dividend-hungry leaders have allowed a smoke nuisance to destroy values in these large centers. The owners of slum areas have insisted upon the steady flow of unduly large income from congested and unsatisfactory housing and have thus impeded urban progress. The automobile has made access to charming suburban country areas possible for many citizens. The assessments of our large cities are decreasing. The leadership is moving to the county. The old residential areas are being occupied by an invading force of human beings who are attracted to urban life but who are not educated to make the adjustments for satisfactory urban growth.

The decentralization of the large city in America

is one of the great forces with which new generations must cope. The reasons for the beginnings of these cities and for their growth have vanished. New source agencies for city growth must be tapped if these cities are to maintain themselves. Technological developments no longer make it necessary for industrial placements in large urban centers. Increasing development of all means of transportation no longer gives a maximum of power to a railroad-centered city. The advanced desires of our people for homes of comfort and for homes equipped with man's latest contribution to home science send to the scrap heap many of the homes built a few decades ago, and furnish the reason for further urban decentralization.

Meeting the Problems of Change

A study of the cities of New York, Philadelphia, Washington, Detroit, Pittsburgh, Cleveland, Chicago, and St. Louis will show common characteristics of change and the need for a new type of educational program to meet the demands of the changing problems. Some of these problems are as follows: the training of a mass of rural people, many of them colored, in new urban environments; the maintenance of old city financial burdens and tax rates on decreasing valuations; and contending with the sloughing-off of leadership upon individuals and groups who are unequipped to assume office, or who are unconscious of the rapidly shifting conditions; and the growing recognition that every family is entitled to proper housing as well as to adequate education. Associated with all these difficulties is the problem of maintaining the democratic way of life, of conserving freedom of thinking and action, and of keeping the dictator wolf from the democratic door.

Every school man is aware of the population changes affecting his own educational environment. Not only is city life changing, but so is rural life. Family size is being reduced. The birth rate is being lowered. Elementary school enrolments are decreasing, and secondary school enrolments have already begun to show the effect of past decreases in the elementary areas. The productive economic life-span of individuals is being reduced. Fewer youth are finding their way into employment, and more people in the fifties are finding it difficult to retain their earning place in the economic structure.

The Power of Group Action

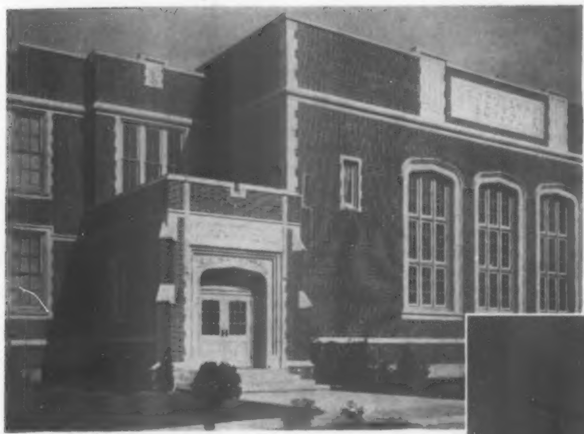
Another serious problem confronts public education and its workers. Students in the field of social welfare, community health and preparation, and other important phases of community planning which affect the family and the individual have been forging ahead in recent years with significantly helpful programs. In many communities playground programs have been expanded, social clinics have been staffed and operated, health centers have aided in rebuilding mankind, and community employment and guidance services have been made available to many. These merely illustrate our society's tendency to perform the services through group action which man cannot do by himself alone.

Within a decade the United States has witnessed the development of man's interest in his fellow men and man's willingness to assist his fellow men far beyond any program heretofore developed in world history. This has cost vast sums of money, much of which has come from the productive resources of the nation and much from its stored-up wealth. Some of this expenditure has been in the form of basic economic relief, but much of it has been used to give social insight, to improve health, and to expand economic opportunity. In many cases, a large part of the sums spent for the latter purposes might be considered as devoted to educational purposes. For most individuals there was an educational realism about these programs. The individuals learned by doing. It should be borne in mind that they were also learning by doing the things that were vital in their own living. Their own needs made the curriculum. The social workers in these areas impinging upon and overlapping with the educational program are to be congratulated upon the many successes which they have achieved.

This growth in social welfare programs represents a significant effort to solve many of man's problems, but it also has driven a definite salient into the educational budgets of the country. Money in increasing amounts is being appropriated for old-age pensions, relief, health, and other pressing social needs. It becomes more difficult to secure the needed funds for public education. Amalgamation must be brought about among these educational, semi-educational, and social forces seeking public funds, or an unreasonable war must be waged between two groups each of which is seeking the same end, namely, the uplift and welfare of our people.

No real believer in democracy desires a diminution in the significant programs which have brought better living and have stimulated the ambitions and hopes of many types of citizens who have been denied in the past. The educational, social, and recreational needs of our communities, even when geared at the highest level, can be adequately financed if educator and social worker, civic planner and school-board member, lay leader and economic expert, business realist and humanitarian idealist, join in local conference to make possible the integration of programs and to develop comprehensive long-time plans covering all outstanding group and individual needs.

Each community of the United States must learn,



A community school should invite wide use through the character of its design, as does the Woodlawn School in Portland, Ore.
(George Jones, Architect)

The people in the neighborhood of the Lemington School, in Pittsburgh, Pa., enjoy its Mayan design and make wide use of the auditorium and gymnasium at either end of the building
(M. M. Steen, Architect)

This aerial view of the Dover (Del.) Community School shows the field house on the left; next, the main building with library, laboratories and classrooms; on the extreme left, the elementary school, connected to the main building through the social hall
(Walter Carlson, Architect)

The science unit of the Shorewood High School in Milwaukee, Wis., makes a splendid building for general adult use
(Herbst & Kuenzli, Architects)

The manual arts unit of the Shorewood High School is ready to serve Milwaukee's citizens for fourteen hours a day. A unit in itself, it is readily accessible to evening groups
(Herbst & Kuenzli, Architects)

as it has never learned before, to operate as a unity, to capitalize not only the physical but also the human wealth in its environments, and to rethink the fundamentals of its governmental and quasi-governmental functioning. It is reasonably safe for us to assume that the communities of the wealthiest nation of the world can provide happy, successful living for their membership if they are willing to concentrate upon their community problems.

The School's Community Connections

An outstanding way of using the agencies of public education fruitfully is through a more effective coalition of community and school. The Survey Commission,* making a report on the schools of St. Louis, Mo., in 1939, recommended the extension of this community-school relationship into all levels of the school organization. It was even suggested that the names of the schools be changed to incorporate the spirit of community connections. The nursery school, kindergarten and primary grades were thought of as being housed in the Home Life Unit, thus bringing to the school more of the interrelated problems of parents and children and making the school a center for the education of parent as well as child. The school to house the elementary grades was named the Elementary Neighborhood School, with adequate facilities for this community interconnection. The intermediate grades, it was suggested, should be housed in a Middle Community School where a larger community would find facilities that would assist in solving the common problems of the home and of education in general. Grades 11 to 14 inclusive were suggested as an extension of the high school and as the culmination of the nursery school-kindergarten-6-4-4 organization. Their plant facilities were thought of as a Regional Educational Center, with opportunity for recreation and vocational rehabilitation, where educational advancement would be provided not only for high-school students but also for the adults of the community.

There is no doubt that America has had a reawakening of social conscience and has acquired a new feeling of responsibility, but our educational planning and offerings must be in line with our new thinking. Real opportunities must be provided in our educational scheme of things for education for family life, better understanding of child nature and child needs, for home building and home making in all their aspects, for economic adjustment, for personal freedom and tolerance, the improvement of community government, the elimination of graft and crime, and the stimulation of wholesome cultural aims. In our urban, as well as in our suburban and rural, areas the school must be set up to provide opportunities in this lifelong process of education. The community school must serve these needs.

* Strayer, G. D., Engelhardt, N. L., et al.: "The Public Schools of St. Louis, Mo." Bureau of Publications, Teachers College, Columbia University, 1939.

The Advantage of the Small Community

The majority of American communities are small. This, it is believed, is a virtue in a democracy because democracy implies intelligent participation by all predicated upon as extensive an educational preparation as ability permits. In the small communities groups may readily be brought into action, and education has an immediacy of influence that may be more difficult of achievement in the larger centers. In the small community the educational plant may be the core of all city planning. The community campus in the small community may have all the virtues of a university campus, and even many more because of the direct association with life's problems. The community school may incorporate the community library, the community museum, the community workshop, the community play house, and the community forum center where all problems of community life, community needs, and community government are discussed.

Such a community school can be built only on a maximum of teaching and supervisory understanding and upon an acceptance of community responsibilities that extend far beyond the narrow confines of the traditional school. Some of the characteristics to be sought in such a community center were present in marked degree in the one-room school of early Colonial days. How to recapture these values for present-day community life is one of the problems of education.

Community School Programs in the South

The organized community school programs of many southern communities have in them much from which the rest of us can learn. In certain of these communities the program of education has been vocational and recreational in pattern and has been directed toward finding and developing within the community itself assets and resources for healthful, successful, and happy living. These organized community school programs have grown out of necessity. They represent good illustrations of what a community that is at a low economic level will do when it is struggling to secure some significant values out of living.

The Ashwood Plantations at Bishopville, S. C., with its community center, health building, cooperative store and shops, community library, and recreation center, is a good example of a considerable departure from what has been called "the traditional American school." In this center the needs of the people are being met, whether they are 60 years of age or 6.

Education has been thought of as an electrifying current running through every-day life.

The new Providence School at Clarksville, Tenn., with its experimental kitchen-garden, school plant nursery, community workshop, and community dining room, represents the effort of another group to solve its educational and living problems through joint effort.

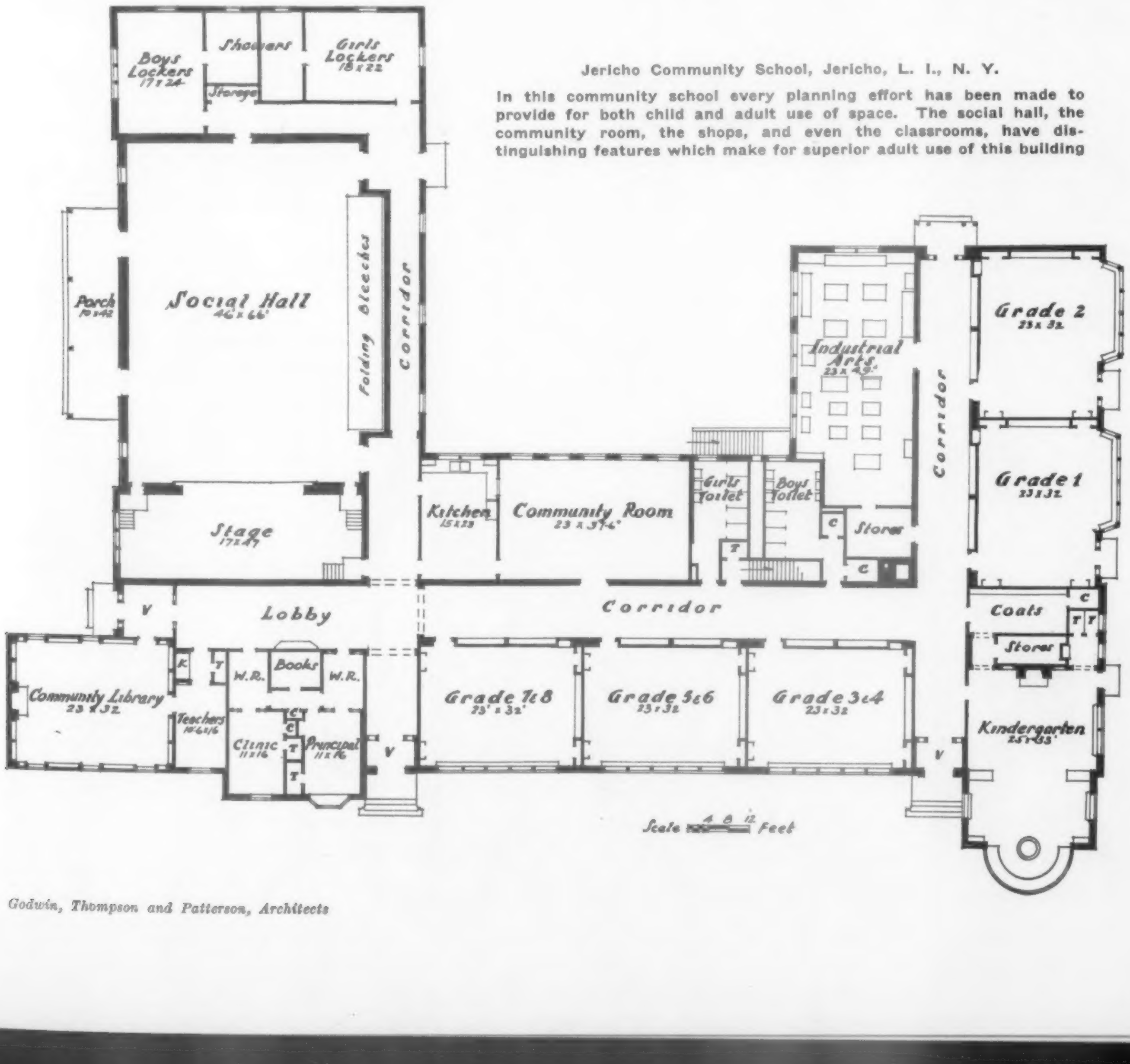
The experiments at Tygarts Valley and Arthurdale in West Virginia, and at Crossville, Tenn., are a few of the many departures from the cut-and-dried school programs of the past. Here the differentiation between elementary and secondary school education, and between child and adult education, is discovered with great difficulty.

Drawing the Adult to the School

There are very few communities in the United States where some integration of school and community life is not taking place. The question that each community should raise is whether the school cannot function more intimately in the economic rehabilitation and social recreation of all its citizens, and how the community program can be best developed toward this end. The institutional character of many schoolhouses has been a barrier to widespread community and adult use. In many instances adults have so disliked the formal school program of their youth that they tend to refrain from entering school buildings again. The very atmosphere of the school is repressive to them. A discovery of the degree to which this is true in any community might well result in rethinking the existing program for the community's youth.

Many adults fear the social stigma of returning to school. This is an unfortunate outcome of past educational practices. The community school should be so planned and have such an influence on community growth and living that it continuously plays a part in the lives of every adult as well as youth. The community program of the school should be so attractive that adults as well as children will naturally be drawn in that direction.

The school building cannot stand apart from the



Jericho Community School, Jericho, L. I., N. Y.

In this community school every planning effort has been made to provide for both child and adult use of space. The social hall, the community room, the shops, and even the classrooms, have distinguishing features which make for superior adult use of this building

Godwin, Thompson and Patterson, Architects

The music room in the Grant Junior High School, Syracuse, N. Y., is admirably designed for adult use. (The room was not completed at the time this picture was taken)
(Randall & Vedder, Architects)

The sewing-room facilities provided for the M. Rutledge Rivers Junior High School, Charleston, S. C., are equally suited for the use of adult and day-school groups
(Simons & Lapham, Architects)

The Early-American recreation room of the Appleton (Wis.) High School was designed to teach home appreciation and home living in all life's stages
(Smith & Brandt; Eschweiler and Eschweiler; Architects)

The Cranford (N. J.) High School has an attractive cafeteria paneled in knotty pine, which is used as a community center for banquets of a civic nature and for the annual meeting and dinner of the Adult Education group
(C. Godfrey Poggi, Architect)

The double gymnasium which is the center of the social dancing, badminton, golf, and various other recreational programs of the Adult Education School at Cranford (N. J.) High School

(C. Godfrey Poggi, Architect)

This industrial arts layout should prove very enticing to the adult mechanical-minded individuals of the community served by the Takoma Park Junior High School, Montgomery County, Md.

(Carl J. Malmfeldt, Architect; Tooker and Marsh, Consulting Architects)

A small neighborhood auditorium in the Lawrence Elementary School, Hartford, Conn., designed as the center of a building section used by adults

(Carl J. Malmfeldt, Architect; Tooker and Marsh, Consulting Architects)

A charming library design for adult as well as student use in the Lawrence School, Hartford, Conn. With its artistic fireplace and splendid lighting, this room may serve for many evening purposes. Book alcoves and small conference rooms adjoin on the right

(Carl J. Malmfeldt, Architect; Tooker and Marsh, Consulting Architects)

community with a traditional curriculum and a traditional use. As far as possible, the school, through its facilities, should be permitted to contribute to the improvement of living for adults as well as children. In the new planning every adjustment should be made to meet this combination of needs. The child in a democracy belongs to the parents. The child's school should attract the parents and be planned for the needs of the parents. The child is also a member of the community. In his education he should be encouraged to consider himself as a member of the community. The development of community schools in which adults as well as children frequently work side by side will help greatly in the advancement of American democratic living.

Modern communities follow the principle of using and wearing out their physical properties whenever social, recreational, or educational gains for human beings are advanced thereby. No school in a community, no matter how fine its architecture, or how permanent its bearing walls, or how fire-resistive its corridors, will have much value if the community social life is stagnant, if its economic structure is tottering, and if its population does not know how to live.

The community school rests upon a better understanding of life round about. In its development the environment has curricular advantages. The extracurricular activities of the present school will take on virtues and values that may outstrip the returns that come from certain traditional curriculum areas. The school must adapt to the needs of the individuals and must adjust also to the community itself. The community school may be expected not only to exercise an influence but also to play an important part in economic and social rehabilitation, in actual community planning, and in the improvement of community government.

Learning from the Past—Adjusting to Present and Future

In too many American centers today the school is training for a high type of government and citizenship participation, but the government in those communities is altogether too frequently of a less inspiring and less competent pattern than the schools have pictured. There is every reason why the school should be a truly active community center. The school cannot stand on a hill apart from the goings-on of the mill and the market place. The educational program must be intertwined with the needs of the mill and market place, and the workers in the schools and in industry and commerce should join in frequent discussion of common problems and in frequent action in getting the desired solutions.

In the community school there is nothing that belittles the values inherent in subject-matter. There is full recognition of the assets to be accumulated out of the literature of the past, the languages of other peoples, and the history of human error and success. A community school succeeds only as the participants in its program have the light of ages past shed upon their efforts and their ideas, have the scientific knowledge to proceed with a minimum of error, and have wholesome well-founded democratic ideals engraved on their hearts. The integration of school and community, whether in densely congested urban centers, or among widely distributed rural populations, is a necessary part of our democratic development. If democracy is to survive, the people must be constantly informed and must know what to do and how to do it. The dependency will be upon the school which has discovered the community's problems as well as those of the individual, and which has advanced its program to meet the emergencies as they arise.

The community school is not merely an idealistic dream. It is fast becoming a reality in American villages and cities. The rapid strides taken by adult education in many communities have tended toward the emergence of real community schools. The advancement of recreation programs has made a reality of the community campus. Recent emphasis upon music and the fine arts has brought adults and children together in many delightful activities centering around music, the drama, and the other art interests of mankind.

In a volume on "Planning the Community School" * many illustrations appear showing the nation-wide progress that has been made in the adaptation of school buildings to meet wide community needs. It appears that there is no aspect of community need for which planning has not already been incorporated in a school building in this country. The Will Rogers High School in Tulsa, Okla., with its community-auditorium and accessory spaces, the Dover, Del., Community School with its social hall, the Arts and Industries Building of the Oberlin, Ohio, High School, the Mechanic Arts Building of Evansville, Ind., the school buildings and grounds of Fort Worth, Texas, the Greenbelt towns with their community centers, and the Van Hornesville, N. Y., School with its many facilities adapted to community purposes, are a few of the hundreds of examples that might be given of the nation-wide trend toward community school development. The community school is one of the bulwarks of democracy. More and more the schools of America will take a place of leadership in American community life which will point to the need for adjustment of school plant to many adult as well as child purposes.

* Engelhardt, N. L., and Engelhardt, Jr., N. L.: "Planning the Community School." American Book Company, New York, 1940. This volume has formed the basis for this article, and certain sections have been quoted therefrom with the permission of the publishers.

The home economics room in the Grant Junior High School, Syracuse, N. Y., is a cooking laboratory well equipped for mothers and maidens alike

(Randall & Vedder, Architects)

The household arts cottage at Hatboro, Pa., is a type of school facility which should attract the mothers as well as the girls of the community

(Wm. Walter Witman, R.A., Architect)

In the model apartment in the Grant Junior High School, Syracuse, N. Y., school and home interests are combined in an attractive living-dining-bedroom suite

(Randall & Vedder, Architects)

PLANNING THE SECONDARY-SCHOOL PLANT FOR COMMUNITY USE

A Survey of Facilities Adaptable to Community Use Incorporated within the Plans of Secondary-School Buildings Erected with the Aid of the Federal Public Works Administration

By EDWIN S. FULCOMER

Lincoln School of Teachers College, Columbia University

THE history of adult use of school buildings in the United States is a long one. American literature abounds with references to singing schools, spelling bees, religious services, and political rallies which have been held there. In the *Atlantic Monthly* for January, 1896, H. E. Scudder's article, "The Schoolhouse as a Center," engaged the attention of many people interested in enlarging the services of public school buildings to the community. In June, 1915, the "Recreational Bibliography" of the Russell Sage Foundation appeared, and furnished conclusive evidence that the concept of community use of school buildings had occupied the attention of many writers between 1896 and 1913. In general, the aims of the activities to be conducted in community schools were summed up by Clarence A. Perry in "The Community Used School." He stated the purposes of the community school as "promotion of public health, civic efficiency, and social solidarity." Thirty years later such educational objectives have still to be reached in many American communities.

Study of Plant Plans

During the generation which has passed since these aims were promulgated as desirable educational objectives, secondary-school buildings have increased in number, and the capital outlay for the erection of approximately 25,000 high-school plant structures became a major item of educational expenditure. During the depression period of 1932-36 the annual capital outlay expenditure for public schools in the United States decreased to $147,000,000. Then the reservoirs of credit of the Public Works Administration were opened, and school-plant building and rehabilitation programs were widely instituted.

To determine the extent to which plant space allocations serviceable to the whole community were being incorporated within the plans of buildings approved by the architects of the PWA became part of a study on planning the community school.* Permission was granted by the PWA to study the files of plans of school plants erected or under construction during the years 1936-1939. Several hundred plans were examined and their plant facilities were recorded.

Desirable Space Allocations

An objective measure for recording plant space allocations and facilities adaptable to community use was devised. The check list recorded plant features designed or adapted to meet such adult needs as Bryson has suggested in his five functions of adult education, and as Engelhardt has urged in school buildings for community use. The latter recommends such adaptations of present plant features as: (1) local museums showing past local achievements; (2) libraries adapted for use by all ages; (3) shops equipped for adult use; (4) home economics laboratories designed to train women for better home management; (5) gymnasiums equipped with lockers and showers for both men and women; (6) a new type of auditorium adapted to other uses than that implied in the spectator concept of the oversized auditorium which is frequently located upon the inside area of the secondary-school plant.

The "Handbook of Adult Education in the United States" was also consulted. It recommends fifteen areas where public school buildings might be utilized. In 1936 these were listed as: (1) Agricultural Extension; (2) Arts (most courses creative, not appreciative); (3) Forums; (4) Libraries; (5) Clubs for Men and Women; (6) Museums; (7) Music; (8) Parent Education and Child Clinics; (9) Puppets; (10) Radio; (11) Recreation (National Recreation Association recommendations); (12) Little Theater; (13) Visual Education; (14) Vocational Guidance; (15) Health Education.

From their description in the docket of the PWA

* "Planning the Community School," by N. L. Engelhardt and N. L. Engelhardt, Jr. American Book Company, New York, Sept., 1940.

approximately 200 plans indicated possible sources of information for the study. Examination of more than 100 of these revealed, however, that they were plant additions designed to care for an increasing secondary-school population. Classroom additions, enlarged auditoriums and gymnasiums were generally intended to increase the facilities of existing secondary-school plants. Field houses and service units outside the periphery of the plant structure indicated not general but specific use for boys and girls.

New Plant Structures

Sixty-five plans were those of buildings intended to house a conventional secondary-school program. Many of these, however, were to be located in states ranked low in ability to support public education and would replace buildings unsuitable for present-day use. Of their ability to meet the real needs of the children in these areas, one may entertain reasonable doubt. Certainly, few space allocations indicated as serviceable in the areas of Adult Education specified in the Handbook were located in the plans. However, since adult use of school buildings is increasing each year, it is possible that many of the facilities of these buildings, though designed for the use of high-school boys and girls, will be used by the adults of the respective communities.

Plans Incorporating Community Facilities

Forty-five additional plans located in fourteen states covering the whole range of economic ability to support public education were selected for careful analysis. States of the Pacific Northwest were not represented, but plans of buildings to be erected in New Hampshire, Massachusetts, New York, New Jersey, North Carolina, South Carolina, Virginia, Pennsylvania, Wisconsin, Missouri, Nebraska, Texas, Nevada and California were included in the survey. Many of the buildings were nearing completion and would be available for use in the school year 1939-40. The plans of buildings in New York, New Jersey, Wisconsin, Texas, and California were given special attention, since in each of these states a number of well-known programs of Adult Education were being carried on.

Auditoriums

Thirty-five of these plans included auditoriums with stage facilities for conducting dramatic and chorus activities. Nine plans provided auditorium-gymnasiums with stages designed for use as bleachers as well as for stage and musical productions. One plan designated a library-auditorium in which the stage was to be used as an English classroom. Except in the few cases where the auditoriums were housed in a separate wing, they were accessible only by entering the central area of the school plant. All but one of the auditoriums, however, were at the street level.

Gymnasiums

Twenty-nine of these plans had separate gymnasiums for boys and girls, nine had a single gymnasium with two sets of lockers and shower-rooms. Twenty-six shower-rooms adjoined the gymnasiums, the remainder being in the basement, and in the gymnasium-auditorium plans they were generally located beneath the stage and served as dressing rooms for stage productions. Generally, these gymnasiums were not located on the outer periphery of buildings, to avoid interference with quiet activities, and few could be shut off from the remainder of the building for adult or evening use.

Libraries

Thirty-two plans provided for libraries, of which only eight were readily accessible to adults during the school day. Twelve plans included library workrooms as part of the library unit, and two were library-study-halls.

Kitchen—Dining Room Facilities

Twenty-two plans provide dining rooms with attached kitchens sufficiently commodious to serve the needs of the community. Four locate the Home Arts unit in such proximity to the auditorium as to make possible easy service of meals upon special occasions, but this use of the auditorium as a dining hall is infrequent, since, with the exception of these four plans, the Home Arts laboratories and kitchens are generally located above the ground floor.

Shops

Shops are included in twenty plans; only one plan, however, provides public wash-rooms adjacent to the shops. Though this important provision for adult use of shops is found but once, the plans frequently provide such generous space allocation that shops of sufficient variety to offer vocational training and retraining to adults, as well as orientation in a congress of vocations to secondary-school students, can be offered for wide community use.

Music and Art Rooms

Included in the plans are many provisions for furthering community interest in music and the graphic and plastic arts. Fourteen rooms were specifically designated as music rooms, though their design and allocation includes classroom use. Four plans provide rehearsal rooms for band and orchestra, and one plan provides a choral rehearsal room. The

design of a large, suburban secondary-school plant includes a stage-craft shop and dramatic workroom.

Although only thirteen spaces are specifically allocated for art rooms, the size, location, and fenestration of these rooms indicate architectural attention to new concepts of these spaces which is not equally apparent in the design of other spaces of the plant structure. These art rooms are generally located upon the upper floors of the buildings, and although they are not readily shut off from the remainder of the building for adult use at night, they can be utilized by the community. Engelhardt's recommendation of space allocation for community museum purposes was followed in only one plan, which incorporated a Museum Lobby whose design indicated primary use as a gallery for art exhibits.

Health Clinics

Fifteen health units and medical clinics were located in the plans. Two plans allocated space for a doctor's office, and two provided dental clinics. All these medical and health provisions were located on the first floor near the main entrance and could serve as public health clinics for adults. The latter are included, however, in the plans of buildings to be located in prosperous suburban communities. One space allocated was designated as a hospital room, and one "treatment room" was located between the offices of the physical directors. Space allocations for the "promotion of public health," for which Perry saw widespread need in 1911, are still uncommon features of the present-day secondary-school plant.

Community Rooms

Six plans had spaces designated for community and adult use, and eight plans provided public rest rooms. Five plans had check-rooms located near large unit spaces, and five had ticket-booths in the auditorium lobby. Two plans allocated spaces for adult play rooms, and one space was designated a "naturalization" room. These were the only specific allocations of plant spaces designed for wide community use which were discovered in the plans.

The space allocations adaptable to adult and community use suggest growing recognition by both architects and educators of the need for educational and recreational centers available to the entire community. In many communities this consciousness of need for community buildings has been crystallized in requests for PWA grants to assist in the provision of community centers.

Community Buildings

In the docket of plans of the Public Works Administration, 32 of the 48 states were represented as requesting Federal aid in the erection of community buildings. Texas, Minnesota, Michigan and Oklahoma each had eight communities seeking loans for assistance in providing these community facilities. More than 100 such requests were located, but few projects were under construction at the time of the survey. Some of these requests, particularly in rural communities, had been turned over to the Farm Security Administration, as study of the building program of this Bureau indicated. Seven plans of community buildings which had been approved and were under construction were subjected to analysis.

Six of these plans had space allocations for gymnasium-auditoriums with stage facilities. One was a gymnasium-swimming pool building making provision only for physical recreation. Each plan made provision for separate showers and lockers for men and women. Four plans had kitchen allocations with provisions for serving meals in the gymnasium. Two had health rooms, one, a clinic and doctor's offices. One made provision for a police station and a police court with cells attached to the community building.

With the exception of the police court and detention allocation, not a single facility indicated in these community building plans is not a common feature of the secondary-school plant plans which were scrutinized. In fact, such space allocations are those which are most frequently added to the normal classroom allocations. The provision of such facilities within secondary-school plants would serve both high-school students and the adults of the community more generously.

A Center of Community Life

Since increasing awareness of real community needs has turned the attention of many communities toward buildings in which these needs may be met, it may appear strange to find such slow acceptance of public school buildings as centers of whole community activity. It must be recalled, however, that most communities think of secondary-school plants as primarily for service to their boys and girls. The established American tradition of parents desiring the best for their children has prevented acceptance of the concept of the community school, lest privileges which they seek for their children may be curtailed. Modern secondary education pleads for facilities which would serve both boys and girls and adults, for the increasing program of secondary education carries the possibility of preparation for adult life within the community. If facilities for wide community use were incorporated within the secondary-school plant, there would be no hiatus between the use of community resources as students and that which high-school

graduates could profitably enjoy as adult citizens.

The Public Works Administration seems to have placed no restrictions upon the buildings to which its architects lent the stamp of approval. If most of the plans seem to be less far-sighted than students of community needs might desire, no blame need be attached to an administration whose primary function was to provide jobs for unemployed men and women. Communities are not yet fully aware of what they might enjoy if secondary education became concerned with the best possible life for all the boys and girls in the community. The new secondary-school buildings which will soon serve their communities seem to be what they want at this time.

Increased educational opportunities for the people of America will result from the use of such space allocations adaptable to community use as have been incorporated in the buildings erected with the aid of PWA grants. Public-spirited and community-conscious laymen and educators have done much in the past to adapt existing school plants to community use. Though the plant facilities described may have been intended primarily to enrich programs of secondary education, their use by the adults of the community is to be expected. The growing recognition of community needs and the possibilities for meeting these needs which secondary-school plants embrace may turn the attention of the community to the use of the secondary school as a center of community life. Without the assistance of PWA funds, which supplemented those provided by local communities, many plant facilities adaptable to adult use could not have been supplied, especially to those communities which were most needy.

SECTION II
DESIGN AND CONSTRUCTION OF BUILDINGS

A COMMUNITY PLANS ITS SCHOOL

The Consolidated School of College Station, Texas

By S. B. ZISMAN

Assistant Professor of Architecture, Agricultural and Mechanical College of Texas

THE political and social institutions of our democracy rest on the basis of enlightened citizenship through public education. It is for this reason that the building of a school with its many facilities constitutes the most important responsibility of each community in this country.

Yet how many communities adequately meet this responsibility? In the vast majority of cases there is neither the necessary long-range planning for education nor the necessary related study of the community itself. It is a commonplace remark that most new school buildings are obsolete almost before the first day of classes.

You do not have to be an architect nor a teacher to appreciate the fact that school plants have not kept pace with the changes in curriculum and educational methods, or with changes in the community. Sites are badly chosen without proper consideration of primary factors of location, size and surrounding conditions. Recreation facilities are inadequate or poorly organized. The buildings themselves have been unsuitably planned for the educational process that is needed to take place within them.

We cling to outworn ideas of unit and classroom sizes and schemes. We keep using wasteful hall and stair spaces. With the same lack of creative thinking we insist on costly, tasteless decoration applied for the sake of vain monumental show at the expense of vastly more important needs inside the building. We have not met the requirements of new teaching means such as the motion picture and the radio. Education is being changed to help create the enlightened citizenship we are striving for, but it is being shackled by the outmoded conventional approach in planning and building that has produced expensive but poor looking and poor working structures.

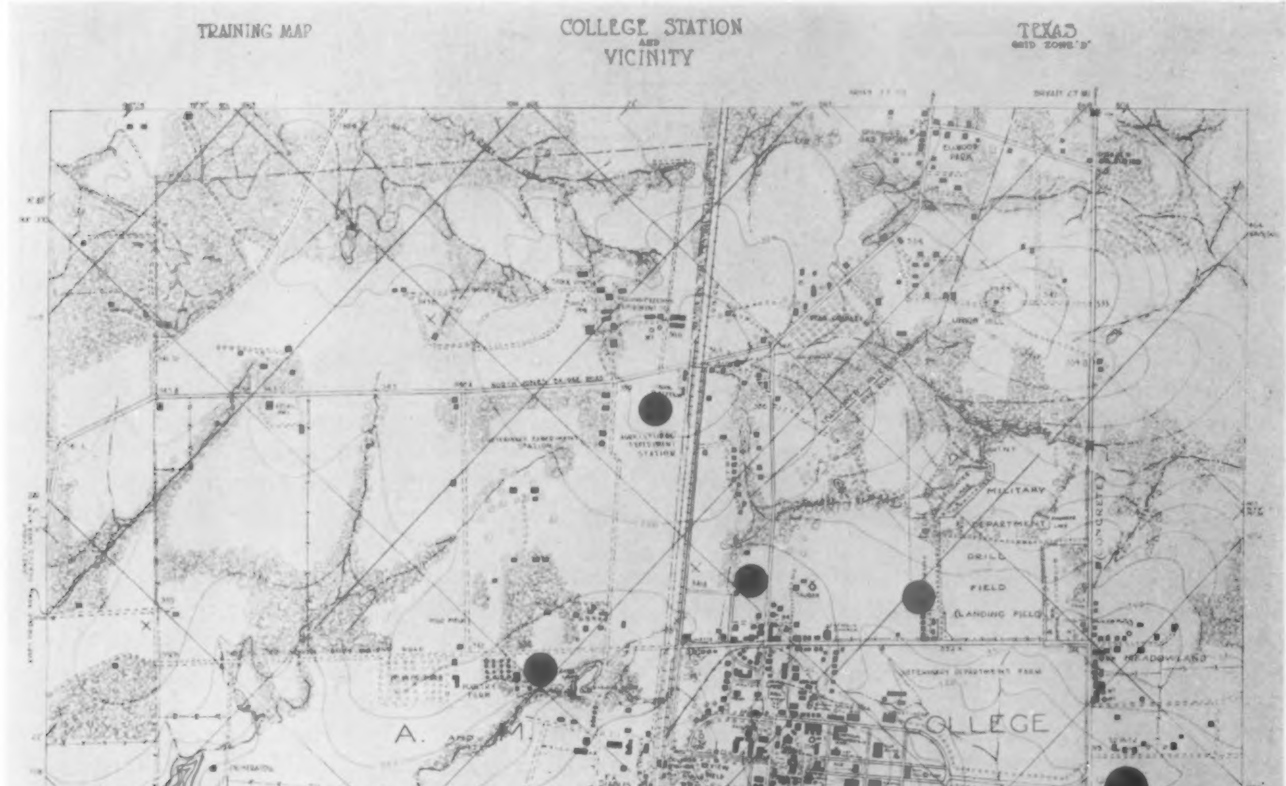
If we are to make our school buildings serve the purposes and needs of present-day education, all of us—taxpayer, school board member, teacher, architect—need to be willing to create a modern environment for modern education. We need to give ourselves over to a commonsense program of long-range planning. We need to relate schools to community planning in all its aspects—financial, physical, social. We need to observe principles of flexibility and multiple use so that the school can fulfill its role as the center of the child-adult educational life of the community. We need to take advantage of new types of layout and equipment. Rather than the false and ugly medievalisms of cathedral-like and palace-like exteriors, we need to plan in terms of the inner needs, in terms of orientation, lighting, freedom of space, usability. It must be recognized that the school building conditions the program of education and thereby has a vital bearing on the ultimate social development of the community.

The Consolidated School of the Independent School District of College Station, Texas, was completed in February, 1940. Sixteen months previously, in September, 1938, a study of the community and the needs and possibilities of a new school was begun in the Department of Architecture of Texas A. & M. College, which is located in the district. This study was undertaken by students in the Department as part of their training for a practice that might include the design of a school. It was intended to demonstrate both to them and to the community of College Station the need for long-range planning, the need for research dealing with local problems of school architecture, and the need for understanding educational practices in order to create desirable school buildings.

Following the research and study of community and education, the students proceeded to design an

elementary school based on a program of requirements evolved from their findings. The study and the resulting design problems were made familiar to the community through public display and through collaborative work with the School Board, the School Superintendent, principals, and teachers. When, later, the final steps were taken to plan and build the new school, the school officials as well as the architects chosen had a clear understanding of the requirements and possibilities facing them.

While having the Department of Architecture close at hand was a fortunate circumstance, it does not fol-



Survey map of school district showing distribution of school children, center of distribution and location of site chosen

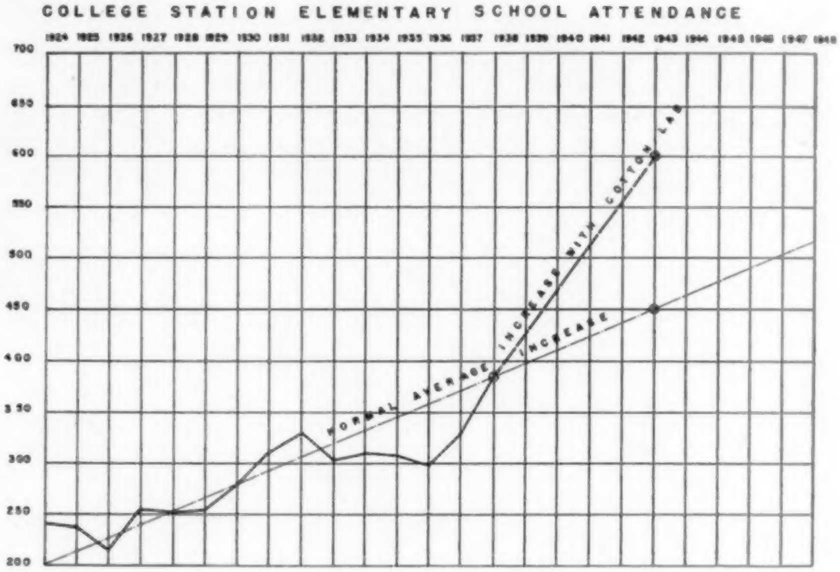


Chart showing anticipated growth of school population in College Station. Figures were taken from past enrolment records and increases were predicted on two possible rates of increase in total community population. The "normal average increase" showed what could reasonably be expected during the next ten years on the basis of both general and local population change. The "increase with cotton lab" showed what could be expected if a proposed Cotton Research Laboratory were located in the community

low that the analysis of a community or of school needs requires the presence of a college. Any community can make the necessary surveys and studies with available resources such as may be found in its own schools. The importance of the experience of the College Station school lies in the procedures that were followed rather than in the accident of special help. Given the point of view that these procedures are necessary, or that they at least help achieve desirable results, each community can start analyzing now its long-range needs with whatever human and educational resources it has.

The Community is Analyzed

Students in the Department of Architecture made three major studies of the community. Two dealt with the school population, and one was the site survey. The first of the studies of the school population was concerned with its location and density. The homes from which the children came were spotted on a map of the school district, and the areas of concentration of the school population were charted. The geographical center of these areas of concentration was then determined. This provided the first indication of the most desirable location of the new school.

This study was supplemented by an analysis of the growth of school population. School rolls for the preceding ten years were gone over to determine the increase in the number of children attending the Consolidated School. An estimate of the anticipated increase for the following ten years was made, and shifts in the area of concentration were recorded.

At the time of this study a special situation existed. Consideration was being given to the location of a Cotton Research Laboratory at the College. This would have meant an immediate sharp increase of 200 families. The estimates of future school population were therefore graphically based on two possibilities —the normal increase and the special increase that would have to be planned for if the proposed laboratory were finally located at the College.

It happened that the Laboratory did not materialize, and consequently the normal rate of increase was used as the basis for the final set of requirements. Some attention was given to what was happening to school populations throughout the country and Texas in general. Any sound planning for growth of population would have to take into consideration trends outside the community as they might affect those within the community. The study showed that it was most likely that there would be a stability of growth and that the normal rate of increase could be safely used as a guide.

The survey of physical sites found its starting point at the geographical center of school population distribution. Two factors had to be considered—the available property and the conditions of traffic. Available property had to be considered in terms of size, topography, orientation, ownership, utilities, surroundings and cost. Alternate sites were selected: one on College property in the event that the College could or would donate the site; the other on private property. Traffic conditions were analyzed to determine possibilities of safe and convenient bus, bicycle, and walking routes.

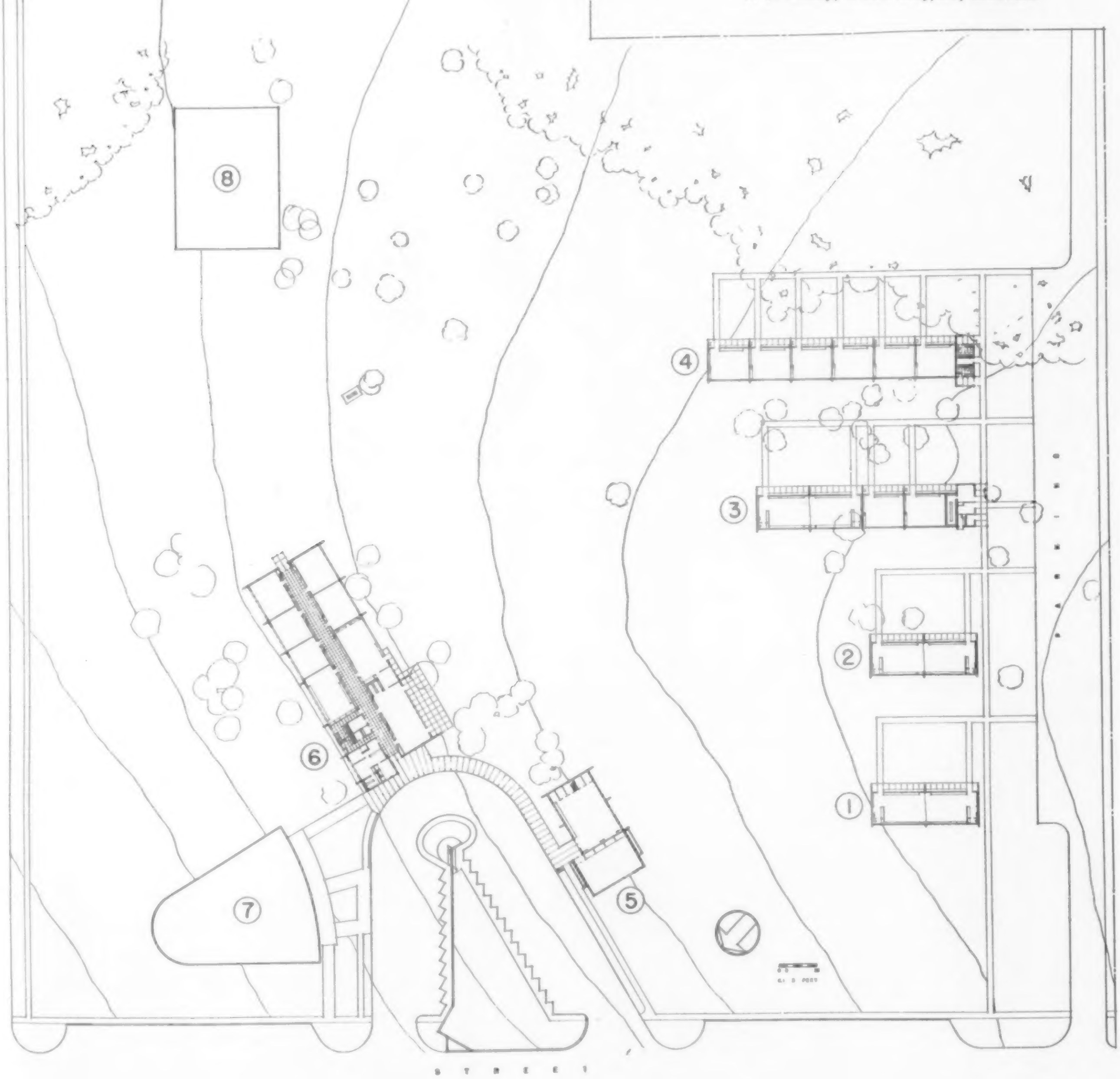
The consideration of sites also took into account the possibilities of recreation areas, sport fields and provisions for developing school-community activities. The architectural students finally chose the most logical site available and built a topographical model of it to scale. This, together with the maps and charts of the population study, provided the graphic information on the community.

The School Board on its part made a survey of the

taxable property of the entire community in order to determine the size of the bond issue that the county could afford. The tax survey committee was composed of representative citizens, including two farmers and three college faculty members (farm economist, farm management researchist, physicist). All taxable property of the school district was reexamined. Taxes were adjusted; in some cases increased, in others decreased. Some property was found not listed at all. On this basis, the amount of the bond issue was set at $75,000.

This analysis of the community established the three most important community factors for the building: the place where the school was needed; the land on which it could be built; and the amount of money that the community could plan on spending.

C. J. Finney, Ernest Langford, Architects



Plot Plan of the College Station Consolidated School, College Station, Texas

ELEMENTARY SCHOOL

1. First-grade units
2. Second-grade units
3. Third- and fourth-grade units, with principal's office, book storage, clinic, school store, and janitor's closet
4. Fifth-, sixth- and seventh-grade units, with boys' and girls' toilets

HIGH SCHOOL

5. Noisy units, music and shop
6. Classroom units; superintendent's and principal's office; boys' and girls' toilets; science room; five classrooms; home economics; study hall and library
7. Future addition
8. Future gymnasium

Northeast view, showing high school on the left and the units of the elementary group ranging back into the trees on the right. The use of separate buildings rather than a single monumental structure was decidedly preferable in order to facilitate the operation of the teaching program and to fit the topographical and climatic conditions of the site. The scheme also permits more economical construction of the foundations. Landscaping is made more interesting and future plant improvement and expansion is aided by this plan layout

Educational Needs are Analyzed

Students in architecture at A. & M. are trained to study the process of use of a building before they attempt to draw plans for it. In the case of their study of the new Consolidated School, their first task was to make a study of present-day education, its philosophy, its trends and procedures. Each student undertook some research dealing with a phase of education that would influence or affect in any way the design of a school plant. These investigations included such subjects as "Activity Program," "Community Uses of School," "Outdoor Classrooms," "Visual Aids in Education," "Workshops for Elementary Schools," and "Ramps for School Buildings."

In addition to recourse to published material, the students made inspection trips to existing schools of various types, old and new, local and distant, rural and urban, small and large. Consultations were held with leading state educators. Finally, the teachers, the principals, and the superintendent were interviewed.

Combined with the findings of technical research on school lighting, ventilation, acoustics, storage, and equipment, the reports of the research gave a broad up-to-date over-view of all general factors that need to be considered in the architecture of the modern school. Out of this material a flow chart or process diagram was prepared. This shows graphically the areas and relationships for all the various functions and operations of the school building.

It was necessary to determine just how these general considerations of education were particularized and implemented in the local school system. Consequently, the next task was to interview the classroom teacher and the school administration. This is one step in school planning that is unfortunately neglected. Those who operate the inner workings of the school are too often not consulted concerning the needs of their pupils and the requirements of the educational program for which they are responsible. Teachers are intimately aware of existing shortcomings, and many are alive to possible improvement. Often, too, teachers will be found who have given careful thought to school planning for a desirable educational program not possible to achieve in the existing school plant. The classroom teacher should be considered one of the clients.

Each teacher was given a questionnaire. Part of the questions dealt with the existing program, the subjects taught, the kind and amount of books and other teaching paraphernalia being used. The remaining questions dealt with the teachers' suggestions and ideas. The results of the questionnaire were tabulated on the basis of space, subject and equipment requirements for each grade. Existing handicaps and inadequacies were noted.

All the findings cannot be listed here in detail. Certain requirements were characteristic for all elementary grades and were incorporated in the design program. The more important requirements included:

1. More space for activity programs.
2. Movable desks and chairs to allow flexible arrangements for socialized study, play, dramatizations.
3. Increased storage, locker, and cloak room space.
4. Lavatory and drinking fountains in each room (grades 1-3) or very close to each room.
5. Outdoor instruction areas.
6. Increased space and wall area for corkboards, museum displays and other visual aids.

The Students Design the School

As a result of the analysis of community and education, the architectural students were able to work out a program for the design of the school, the choice and description of the site, the size and number of classrooms, the areas and space for storage and equipment, and the type of construction.

The actual design of the school was then undertaken. The solutions were presented both in models and in drawings. The School Board and the School Superintendent were brought in to help judge the problem and to become familiar with the schemes proposed. Perhaps the most important result of this collaborative effort was the familiarization by the community, not only with new ideas, but with the

rational long-range approach to school planning, an approach based on careful study and estimate of conditions and needs of the educational program in terms of community growth.

The Architects Take Over

When the time came for the final planning of the building, the architects had a sound basis for work. The study of the architectural students had uncovered and clarified many important points as to size, location, and the number of children to be provided for. Then, too, their work had opened the way for a rational approach to a school plan by demonstrating the values and advantages of new ideas and solutions in their own problems.

It was necessary, of course, for the architects to re-analyze the program in the light of later decisions arrived at after the work of the student architects and in light of the restrictions imposed by the antiquated school laws of the state. Essentially, however, the problem remained the same, and the school, as it now stands, follows the findings and results of the students' work.

The instructing staff of the Department of Architecture had organized and supervised the study from the beginning. It was natural and logical that the staff members would collaborate on the sketches, and working drawings, site model, construction details of the final design. Similarly, experts from other College departments were consulted on ventilation, landscape, and financing. The point to be stressed is not the special aid of the college resources to this particular building. The important fact is that any community needs to utilize its own resources, professional and otherwise, to the fullest advantage. On this basis the school is in all respects a community undertaking.

Planning the Site

The layout and grouping of building units were dictated by the topography, the orientation, and the adjacent traffic artery. The contours of the ground controlled both the direction and the length of the buildings. Economical planning made this necessary in order to keep the amount of grading to a minimum and to cut down the expense of excessive foundation construction of long buildings. The orientation of the buildings takes into account the heat and glare of the Texas sun, while favoring the desirable prevailing breeze from the south. The location of the site adjacent to a traffic artery made it necessary to provide parking and unloading spaces on the property.

Separate play areas are provided for both high and elementary schools. Practically all existing trees were saved, the units being placed so that not only is the landscaping a simple problem of taking advantage of nature's gifts, but the outdoor instructional areas have natural shade. Nature study is thus intimately provided for.

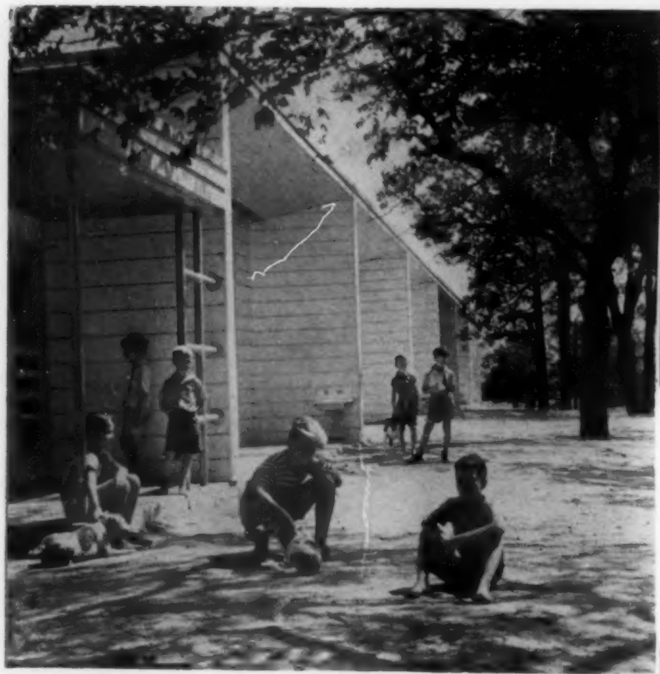
The Construction of the Buildings

It was recognized from the beginning of the undertaking that the available money would restrict the building program in many respects. The entire plant—buildings, equipment, athletic fields and landscaping—could not all be completed at present. Nevertheless, in line with the entire procedure, it was important to make complete plans of the entire plant, including those parts that would have to be left for future expansion. The most important and immediate needs had to be met at minimum cost consistent with the program requirements of size and facilities.

Careful study showed that a one-story building of wood frame construction would be most economical. In addition to the advantages of immediate lower cost and a more desirable plan for educational purposes, this arrangement would allow economical expansion or modification. Fire drills have shown that all the buildings can be emptied in 27 seconds.

Maintenance costs can be extremely low because of the plan arrangements, the handling of surfaces and

Air view of the school and its site. Topography influenced placing of existing elements and those still to be built, such as sport fields to be developed in the distance, outdoor theater, auditorium, gymnasium near existing buildings. Bus and auto parking separated for high school and elementary school groups. Hazards of main traffic artery avoided by the arrangement of loading and parking deep into the school grounds

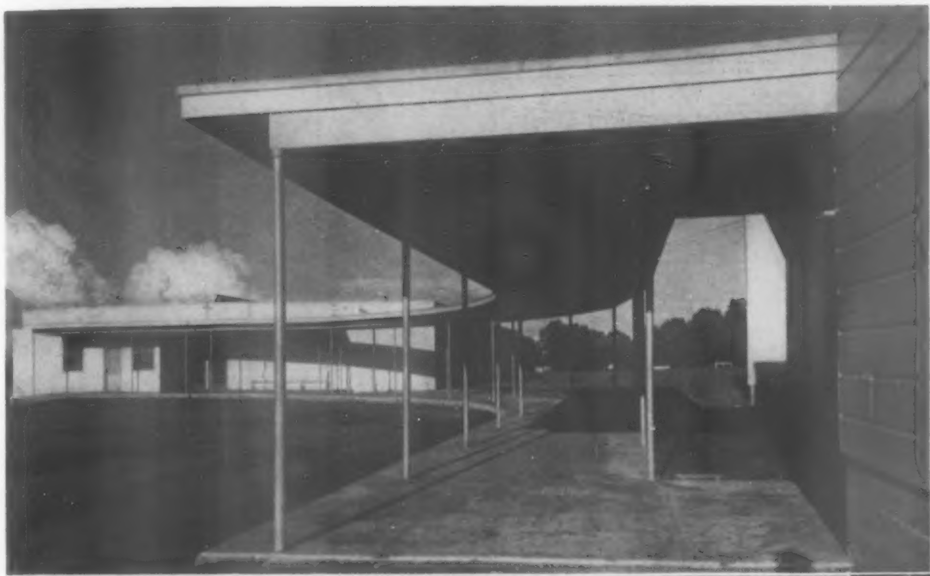


Above—One of the larger elementary units containing the upper elementary grades. The end of the building contains pupils' toilets and janitor service storage rooms. Classrooms are protected from heat and glare of the west sun by the blank walls, the louvered openings being used to facilitate cross-ventilation. Wall-fin projections are used to brace the long continuous walls

Above—Toilets for upper elementary classes are grouped at the corner of the building unit. Projecting wall-fins provide separation for the classrooms

Right—Elementary classrooms open to the breeze and are shaded from the sun during the hottest part of the day by the terrace overhangs as well as by the surrounding trees. The terrace and adjacent ground is used for outdoor classrooms. The projecting wall-fins add privacy for indoor and outdoor class activities while helping support the walls and wide overhangs. Corresponding fins also house sliding door panels between classrooms of the first and second grades. The screened openings in the soffit of the overhangs afford ventilation through roof spaces

Left—Sliding doors rolled back to show interior of lower elementary classroom and flexibility of space arrangement. Wall and top of cupboards on the left combine to permit various kinds of display. Teacher blackboard screens toilet, washstand, workshop and teacher storage arrangements. Light measurements showed that all parts of the rooms are evenly and well lighted

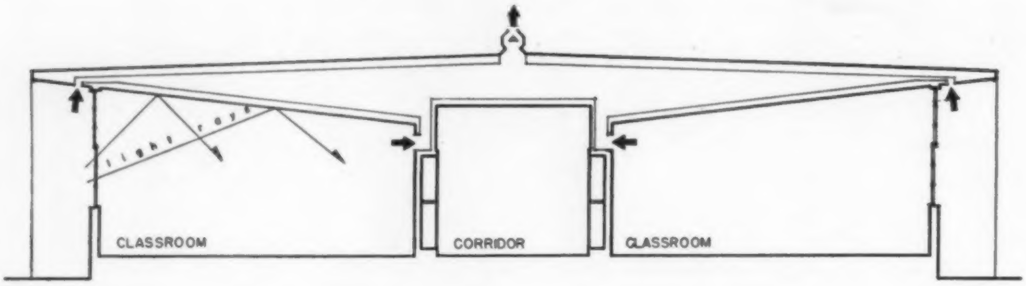


Left—Sheltered passage is afforded between main high-school unit and workshop-music room unit. This is the approach from the road looking towards the high-school classroom building, which also contains superintendent's office to left, and library immediately to right of the entrance. This covered passage is also the depot for the school buses and family cars. The wood roof extends far enough over cars to protect loading and unloading

Above—The superintendent's office is arranged for the convenient use of the intercommunicating system serving the entire plant

Above—The high-school classroom unit from the south. Drinking fountain for high-school playground is shaded by fine native oaks

Right—Economy of materials and construction is combined with efficient planning for storage and display in the high-school science room as in the rest of the interiors. The finish of materials is reduced to a minimum for easy and inexpensive maintenance and for freshness and simplicity in appearance. The color scheme is planned to protect those surfaces most frequently touched by hands. The ceilings are sloped at approximately a 15-degree angle to distribute light evenly throughout the room. Wall grilles at ceiling afford cross-ventilation into air duct above central corridor of the high-school building



Section through high-school classroom unit, showing system of roof and room ventilation, sloped ceiling arrangement for better distribution of light in classrooms

materials, and the simplification of mechanical equipment. *The buildings are not constructed to last longer than the life of the bond issue. There was no attempt to burden future generations of the community with an obsolete plant.*

The construction system was planned on the basis of a 4-foot module or repeating unit of measurement. Savings from this construction scheme were estimated by the contractor to be at least 3 per cent of the total cost. The modular system of construction allows future economies in additions or changes in plan.

Walls are covered on the interior with plywood. The finish was simply a coat of white lead wiped off directly after application, leaving the grain exposed and giving the interior a pleasant neutral color effect. The color scheme was worked out to provide maximum light reflection and distribution. Dark colors were used on areas frequently touched by hands. As much of the storage and other accessory equipment as possible was built in as part of the structure.

No unnecessary architectural effects could be allowed, nor were they desired. As a result, the school gains its pleasantness and beauty from the modesty and suitability of its forms and materials, the interesting relationships of the building units, and the fitness of the buildings to the natural growth and topographical features of the site.

The Elementary School

The elementary-school group contains 14 classrooms, office for the principal, and book storage; a clinic, and a pupils' store. Individual toilets are provided in each classroom for the first three grades; they are grouped together for grades 4-7.

Each classroom of the elementary school has its own terrace and outdoor area which allows flexible expansion of the instructional space. Although outdoor classrooms depend in part on climatic conditions, it should be noted that the major consideration is that of the educational program and the advantage of additional space for school work. It is true that in this case outdoor areas can be used practically 95 per cent of the time, yet they are also included in Switzerland, for example, where they can be used only 50 per cent of the time. In addition, sliding doors between classrooms can be opened up to extend further the possibilities of flexible arrangements for various class and school activities.

The separate parking and unloading area controls the circulation so that there is maximum privacy for the smaller children and least disturbance in the distribution of the classes.

The units are oriented to take advantage of the prevailing breeze from the south to which the classrooms open. Cross-ventilation is facilitated by means of the louver openings in the opposite walls. Protection against the cold north winds and the afternoon sun is provided by the solid walls and extended wall fins.

An even distribution of light throughout the classroom is obtained from the ceiling, sloped to give balanced reflection of light.

The High School

The high-school unit consists of five classrooms, offices for the superintendent and principal, book storage, teachers' lounge, study hall and library, science and home economics workrooms, and the necessary toilets. The science room is placed to get north light, while the home economics room is placed on the south for desirable sunlight. Cooking and serving in this room are grouped so that refreshments can be planned for the PTA and other social gatherings.

The general plan of this unit was determined by the circulation necessitated by the type of classes of this part of the school program. "The noisy elements"—industrial arts workshop and the music room—are placed in a separate unit connected by the curving covered passage that is planned to link together existing and future units of the high-school group. This group will serve as the portion of the school most frequently used for community activities.

Future Expansion

An auditorium and gymnasium were included in the plans to be added in the future along with the development of sport fields and other features of the athletic and recreational plant. The plans of both the elementary and the high school allow for expansion of any unit without altering the present building.

THE SCHOOL CAN BE AN ESTHETIC CONTRIBUTION TO THE COMMUNITY

By MAX ABRAMOVITZ

Architect, New York City

THERE is so much talk about traditionalism, functionalism and modernism in architecture today that many feel sides must be taken, a flag flown, and any point of view contrary to one's own condemned. Yet all architects strive for the same result—beauty in building for specific needs, and all use the same fundamental means of achieving it. The real fight should be against non-thinking men entrusted with the construction of a building who do not sufficiently sense their social duty to attempt to execute the best building they can produce.

The problem of producing the most pleasant results, based upon the actual physical needs of a building, is more difficult today than yesterday. The idea of a classroom as a rectangular room with fixed seats is being supplanted by arguments for a variety of more flexible classroom types, sizes, and shapes, and these new concepts are certain to affect the exterior expression of the school building. A multiplicity of uses for the same spaces, the endeavor to make the school building a part of community life as a structure planned for day and evening use, will also affect its esthetic expression. The school building must have an atmosphere which will draw the citizens to it and encourage the full use of all its facilities for extra-curricular activities.

When an agreement on the use of the building has been reached, the architect should make a careful analysis of the contours of the site, and its relation to streets and adjoining property. After some preliminary studies on plans to determine the spaces required for physical needs, he must then think in terms of volume and attempt to arrange the masses of the structure to compose with the character of the property, the surrounding buildings, and the general landscape and atmosphere of the vicinity. The orientation of units, where orientation is important, and the most useful arrangement of fenestration, must also be considered. A structural system must be chosen which will enable him to carry out his ideas easily and permit him to use materials and construction in pleasant relationship with the character of the natural landscape.

Certain rooms which may be large and important and have a definite use can be expressed on the exterior to present their character to the man in the street. The exterior expression of a library cannot reasonably be the same as that of a gymnasium; a kindergarten, a sunlit playroom, should not be confused with a laboratory for chemistry or physics. When these elements are properly designed and disposed in a building, the building will have character. It will have avoided the "institutional façade." A school is a complicated structure, and it is as important that it should present a personal atmosphere to its public as that the faculty should possess a personality of interest to the students.

Standardization

There are arguments for standardization of windows and of the endless details which will be presented to an architect by a school board (or to a school board by an architect); they are often nothing more than a way of justifying the continuation of the pigeonhole type of design which makes planning easier by requiring less analysis and study—to the detriment of the final structure. Of course, some details may be standardized, yet these should be weighed and reconsidered in every problem; an analysis of today's advances may offer improvements. There are many architects and many building committees who encourage thorough studies, and the results are the best proof of the advantage of this approach. Yet there are many architects and committees who think otherwise; for them this article is written.

Site Analysis—Stock Plans

A more careful analysis of the site would bring to mind its contours, its important trees, its adjoining street widths, vistas from the streets and vistas that terminate upon the site, the height and bulk of the adjoining buildings, the orientation, the various street approaches to the school for the student and the citizens of the community. Some sites vary so greatly that it is hard to understand the popularity of stock "T", "U", "H" and "Hollow Square" plans. It is not uncommon to see a sloping site with a stock level plan upon it, with no consideration whatever given to the changes in level. If such a site were studied with respect to its contours, we should see a more interesting building, not infrequently at a saving in expense. It would fit the ground, compose with the landscape and be a contribution to the community.

The so-called stock plans used over and over again

by an architect may save him money, yet will not necessarily save the school committee money, and stock plans used by the board of education's own staff of designers may save initial outlay but are likely in the long run to lead to stagnation and a waste of citizens' money. A large eastern city recently underwent a serious change in its architectural department due to the indignation of an aroused citizens' group who were awakened to a practice of this kind. An adept designer can consider the complex factors of a site and produce an interesting scheme and a beautiful solution without any increase in the operating and maintenance costs.

The Building-Masses

The mass of a building should be considered from the point of view of the man in the street. A relation of low and high masses will be less severe and of more interest than a solid, dull, unbroken mass in a residential area of small houses. A high mass close to adjoining buildings or a street may seem to lessen light and air in a district, yet a simple, strong mass may have its esthetic advantages. The prerogative of choice should be in the hands of the architect-designer and not be set by a preconceived solution based on a stock plan or on another building seen elsewhere.

The building arrangements should be considered as presenting points of interest to anyone viewing it from any of its approaches. Its important spaces, especially if they may be of use to the public, should open upon pleasant vistas. If the site is dull and flat without natural points of interest to direct the designer's imagination, his task should be to make his structure create its own atmosphere and interest.

Climatic Considerations

The climatic conditions of the region in which a school is located have an important bearing upon the character and design of a school. The point may seem obvious, but it is all too easy to find periodicals which show schools of similar exterior expression in two regions of widely different climate. If a brick structure in Georgian style of architecture is good for Maine, it cannot reasonably be good for Florida. Southern buildings need more air circulation and sun protection, and they can use outdoor spaces to a greater advantage than schools in the North. Consequently, a serious study of rooms and relation to the outdoors, studies of windows, of doors, and of terraces with the accompanying vegetation, will produce a building quite different from a school built of the same material and based on the same educational program in the North. Conversely, a school in the northern states, with its demands for warmth, protection and sheltered play spaces, should not have a fenestration as opened and unprotected as one in the South, even though it is designed to take full advantage of the sun and have a pleasant atmosphere. The question of orientation in the North and the South should affect the studies of the façades of buildings, though, unfortunately, most façades yield more to ideas of symmetry and standardization than to a serious attempt for proportion of fenestration with respect to orientation. Two rooms may need the maximum of light. One may face north, the other south, yet the occupants of the southern room should be sheltered from the intense heat of the sun by a projection or overhang of some type. A refusal to consider orientation will sometimes produce a library or a study room with its important main windows to the west placed so that the sun at two or three in the afternoon will enter at a low angle to the horizontal and cause great discomfort to every student in the room.

Form vs. Function

A common axiom of many architects is that a good plan, meaning one arranged to function reasonably, will make a good elevation. This is questionable. A more plausible one would be that a plan is not good until it makes a good elevation—sometimes there are two or three plans which can perform the same functions, and the architect's duty is to discover which plan composes best without compromise with function.

Construction Systems

The skeleton construction of steel and concrete which has become almost universally accepted has been a boon to fire prevention and simplification of building, yet buildings are still designed to fixed patterns of windows, similar to those in the days of wall-bearing construction when the inter-spaces of walls could not be reduced without impairing the soundness of the building. This argument is not directed toward the disappearance of order, for order is not of necessity retained by repetition ad infinitum. There can be order in variety. Skeleton construction today permits greater choice of materials as well as a greater use of fenestration. We may go further and say that our concept of construction has advanced to enable us to build safely and strongly designs of utmost freedom even with systems that are not limited to skeleton structure.

Materials

Materials are an important element in the composition of a building. Local materials in the form of stone and brick often by the nature of the elements of which they are composed have a quality of blending with the surrounding landscape. Stone can often be used dressed and cut, or used as rubble in a wall,

where brick may be uninteresting. It may be used as part of a wall, or to retain a terrace, and will produce a texture contrast to a building of brick. Brick can be likewise used as a contrast to stone.

The window orientation, the individual pattern of the subdivision, and the mullions, can be studied for delicacy or strength. Today there are so many varieties of stock sections that discretion in choice may enhance a building. A door of a contrasting material in an important place can be very effective. The choice of its paint for sash in relation to the wall color, be it brick, stone or stucco, can be made with an esthetic consideration. Sometimes it may mean a fight with a maintenance man who knows that a black or dark-green color does not need the care of a lighter, brighter color, but the slight added expense may be worth the cheerfulness it produces. We are prone to use standard windows of certain well-advertised types throughout a building, but in many cases certain sections may be changed. Some may be fixed units without the visual hindrance of horizontal and vertical divisions. They will produce a variety of pattern in elevation and an interesting expression of room character.

The use of colors, textures, in woods and metals adds immensely, yet at little expense, to the effect of a building. The texture of brick—there are endless varieties—and the color of brick should receive consideration. Woods and plywoods have returned in new forms for many new uses in the exterior and interior and have been treated to withstand fire. Glass has been developed to enable us to use it easily in many ways for various strengths and uses and can enter into the design of rooms, libraries and greenhouses, and overcome the criticisms of heat loss and heavy operating costs.

Doors, shelving, cupboards, wardrobes, and tables can be seriously studied for most effective use and pleasant detail. Stock details should be reconsidered, compared and judged. They may have become antiquated. A little study can freshen them up and make them more interesting, and probably this too can be done at no extra cost. Manufacturers are equipped to produce and study any reasonable detail, and look to ingenious designers to keep them up to date.

Color

The importance of the simple use of paint in the interior should not be forgotten. Research has proved that we react psychologically to color. Classrooms of various color schemes can overcome monotony, create interest, and contribute to the alertness of the student. Walls, floors, and ceilings can be carefully studied for desired effects. The slight added cost of a few cans of pigment cannot compare with pleasantness of color interest throughout the building.

Landscaping

Around the building the judicious choice of pavement, of flagstone walks, gravel walks, of slate, or crab orchard stone, of bluestone, and of precast concrete blocks, widely spaced, offers interest and life to the grounds about a building. The planting of varieties of trees is both educational and esthetically pleasing.

Conclusion

The foregoing paragraphs present the more important factors to be considered in the study of a school building besides the solution of its specific needs. They must be considered to make our schools become a greater contributing factor to our esthetic environment. A school designed for certain needs can be dull and ugly or, for the same cost, can be an attractive and artistic contribution to the community. The difference lies in the attention given to the simple suggested considerations of design on the part of the architect and the building committee.

A NEW DEPARTURE IN ELEMENTARY SCHOOL PLANNING AND ITS DETERMINING PHILOSOPHY

By EDWIN W. BROOME

Superintendent of Schools, Montgomery County, Rockville, Md.

SCHOOL planning has changed with the program of education. Planning for a school had a very limited number of conditions to satisfy when the program of education was thought of as being quite independent of the school buildings and grounds. The old idea that a teacher on one end of the log and a student on the other made a good school, may have had some virtue in stressing the significance of the personal relationship between the teacher and the learner, or the importance of personal influence; nevertheless, the idea was short of saying what the life and program of a school may be. What relationship does exist between the school plant and the program of education?

Children Propose and Do Things

It is generally accepted now that children in elementary school do a good many more things than once was the practice in education. For instance, children make things out of wood, out of fibers used in clothing, out of plastic materials and the like. It is not unusual to see groups of children separately engaged in individual work; at least in some instances, the teacher may be engaged in a quite different way and not with the children as they pursue their self-directed activities.

Still another way in which the changed life of the school is shown may be seen in the number of occasions where the children propose what is to be done. Perhaps the children need to propose with the teacher what is to be undertaken if the pupils are to be in a position to judge accomplishments. Where one person proposes and another acts, it is difficult for the two to agree on the outcomes and what they are worth, since each may have different things in mind concerning the program.

The Learner Does the Acting

If the learner is really to be the learner, he must do all the learning, which means all the acting. Learning to plan together involves quite a different opportunity from the sort of learning that takes place when a person in authority announces the program while the learner performs what he is told to do. There is no proposing and performing by the same person in this kind of situation. The learning is correspondingly limited to the part the student does. It becomes increasingly difficult for the student to be the learner where the teacher is carrying on the actions from which learnings result. Furthermore, where the program of education centers around the students sitting all day, the learnings are correspondingly limited.

Present Living

If the areas of subject matter are happenings in the past with only the required skills to deal with them, the scope of the program may be limited to varying kinds of statements and comments all of which have to deal with things that are already finished and thus have no problems in them; the problems can only be about and not in things that are already over with. Thus it is that the life and program of the school are moving from the sort of area which had to do with the past. While the past may serve as resources, the area of problems is always in the present. Here again, the school is building its life and program in those areas in which the learners are living now.

So long as a pupil was inactive, there was no need for space in which to act. Education as something existing before the learner deals with it, implies a separation between learning and living. So the learning could be arranged ahead of living. Nothing need be provided in the school except a program of referring to living, while the living which gave substance and significance was left entirely to the course of events outside the hours of school. Such a simple kind of program of education may have had support in the psychology and philosophy which has long since been discredited. There is nothing in the present outlook which indicates that a program of education can be formulated for elementary children or, as a matter of fact, for any other stage in maturity, on the basis of separation of living from learning. Feelings, actings, longings, successes and failures and all the other parts of the selfhood of the learner, as well as the subject matter, are in the program of the school. The more acceptable position is in seeing the complete self engaged with all the circumstances as

the life and program of the school. Thus the school is present living.

The direction in which the organization of education is turning seems to indicate that the counsel and cooperation of parents, students and teachers will increase. The design of values may appropriately be worked out by competent professional leaders.

After this, the program, in order to develop the values, has to be organized according to the conditions in each community. The idea of seeing values may be constant; the means, sequence and procedure, nevertheless, must be flexible for their attainment if the counsel of parents and students is to come more into the life of the school. The act of learning involves values, means, procedures, resources, all of which provide opportunity for competent leadership as well as full cooperative participation of teachers, learners and parents. If education as a way of characterizing growth and development becomes more accepted, the isolation and conflict between school and community will decrease.

Present Outlook

The certainty in education, as once felt to be understood, seems to have given way to a broader understanding. This new outlook involves interpretation and analysis of conditions, and thus a new influence is at work. Perhaps the symbols only were the fixed and definite things in mind when education was so limited and absolute. The realness which was lived perhaps was just as uncertain and flexible with varying conditions among the learners, but escaped attention in the inflexible, mechanical way in which understandings were then formulated. So soon as one moves from formal symbol understandings into substance living with all its precarious and contingent conditions, the predictable and formal give place to the probable and real with all its uniqueness. The school as a formal institution is quite different from a school that is in the pattern of living.

One gets the feeling that there must be a very intimate relationship between school planning and the program of education. The impression is that of something emerging in the program of the school. Changes are coming about in the way schools are being thought of. The emerging idea of the present program of education is somewhat different with different persons. There is, however, a common ground with a varying understanding in detail, and in importance, among individuals who undertake to express the program of present education. The more general aspects are fairly acceptable to most persons.

By way of illustration the following are thought of:

1. Children in the elementary school work with many more materials and are much more active in the program of education as it is now emerging.
2. Children who approximate the same maturity stage are more likely to be found engaging in the same program.
3. As the school becomes more like a laboratory, new resources are relied upon.
4. School grounds, as well as buildings, are increasingly being thought of as a resource.
5. Events taking place in the community and in the school are resources.
6. Tools and mechanical equipment are being more used.
7. The discovery of materials useful in the life of the school is being made by the children.
8. The community resources are being increasingly recognized as important data in the program of the school.
9. Groups of children on their maturity stage make their school something more like a community in which real enterprises are being carried along.
10. The relation among pupils and teachers is tending to be cooperative.
11. Outcomes are thought of as changes in the growth of the learner, and less in products of materials as finished objects.
12. Learning about things is giving place to direct experiencing of resources useful in bringing about growth changes which characterize the different maturity stages through which children develop.

Emerging Programs

In discussing the emerging program of education a new philosophy is implied. The maturity of the person in relation to his culture is more evident. A philosophy which characterizes the growth of a person is a departure from a philosophy which characterizes things apart from a person. The emerging philosophy is towards a concern with the selfhood of the individual. How does this determining philosophy work into a new departure in elementary school planning?

The newer community school is planned to use resources different from the more restricted school. Planning the elementary school becomes more like selecting means for the accomplishment of end values now recognized in the program of education. The school plant is a resource useful and appropriate in the program of education that is to be undertaken. As a means, it has equal rank with the more generally accepted values which are thought of as the ends of education. Means and ends are being thought of as inseparable, since neither have independent existence. A new departure in elementary planning lies in seeing the building in terms of the program of education to be engaged in.

What departure in elementary planning may be thought of in respect to the building, the grounds, the location, the size of the plot and the like? Such

questions become significant. To begin with, the school planning may move from congested and mass conditions to a more diversified condition. Suppose these different units are planned for different maturity stages of children. Each unit may be self-contained as to lunch and other facilities for children. Each unit may have its own resources from the school grounds. Each unit may be appropriately used by children who have reached somewhat the same maturity stage. The maturity stages may be more important than we have recognized and planned for. It is thought by some that these stages should be rich, full and adequate opportunities for satisfaction as a way of ripening into the next maturity stage. Each stage has its own fullness. The school planning may well provide for a rich community life within the stage of the group, and be expressive of the characteristic needs which the group has reached. A useful formulation of these stages may be indicated as follows:

Maturity Growth of Children	*School Stages*	*Usual No. of Yrs. for School*
Characterized as the Selfish Period (Changing around 5½ to 6½ years of age) Interest in immediate surroundings	I. Early Primary *Kindergarten—First half of First Grade Characterized by learning by direct sense experiencing and developing a readiness for symbols	One to Two
Characterized as the Clannish Period (Changing around 12 or 13 years of age) Widening interests	II. Primary *Last half of First Grade; Second Grade Characterized by discovery of and beginning use of symbols	Two to Three
	III. Later Primary and Early Intermediate; *Third-Fourth Grades Characterized by improvement of and independent use of symbols	Three to Five
Characterized as the Expansion Period (Extending to about 17 or 18 years of age) Rapid changes in interests	IV. Intermediate *Fifth-Sixth Grades Characterized by increasing command of skills and the use of them as tools in developing knowledge, principles, and relationships	Five to Seven
	V. Early Junior High *Seventh-First half of Eighth Grades Characterized by intense personal and dramatic interests	Seven to Nine
	VI. Junior High and Early Senior High *Last half of Eighth-Ninth Grades Characterized by romantic and imaginative interests	Eight to Eleven
Characterized as the Social Period (Extending through adult life) Adult types of interests reached	VII. Senior High *Tenth-Twelfth Grades Characterized by limiting the fields of interests with intense treatments	Ten to Fourteen

* Grade equivalent as now used.

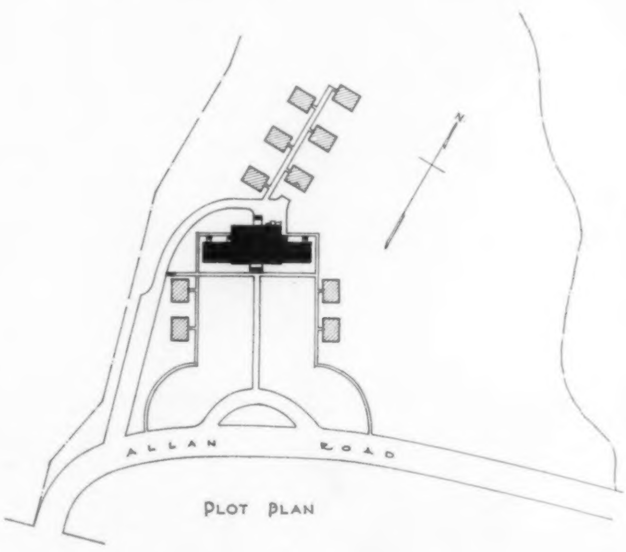
Location as a Resource

The location of the school site may take into account, in addition to the traditional elements of safety, accessibility and the like, the possibility of resources for the program of education. Adequate size sites, not necessarily level tracts, are of importance. The trees, streams and uneven terrain may be of greatest service. Conservation of soil, school gardening, landscaping, and the like, may appropriately become direct and real experiences in the resources of the school site. Experimentation with soil and plants under natural conditions results in valuable first-hand facts in science. Well-selected sites may also provide opportunities for play, picnics, outdoor dramatics, rhythmic interpretations and other similar activities of value.

The feel towards a resource is different from the feel towards an object that is not to be put to work. The movement in the new philosophy is from the school site as an object or place for the location of the plant, to that of a resource useful as data in the living of children who are engaged in solutions of problems which are tangible and important to them.

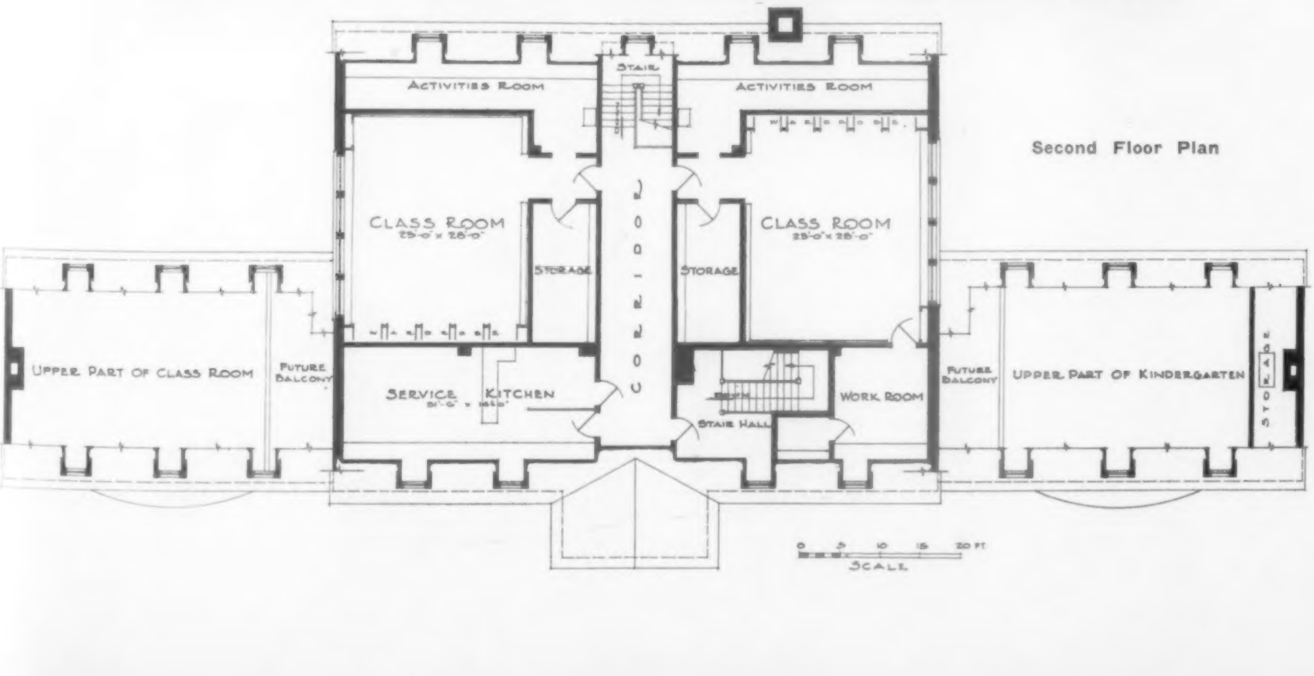
Arrangement as a Resource

The arrangements of spaces in buildings are more and more providing for many groups to be at work



A number of smaller buildings, each accommodating a group of children on the same maturity stage, gives richer possibilities for children to plan and carry out programs for which they are responsible. One central building provides for common needs arising in the school community, such as assembly, cafeteria, administration, health and guidance, services. The smaller buildings are self-contained, with such advantages as washrooms, display spaces, activity rooms, workrooms and group rooms in each separate unit. The decentralized plan expressed in a number of separate buildings makes a community school possible. The emphasis is on community living rather than on institutional living, which has heretofore characterized much of school planning

First Floor Plan



Second Floor Plan

Above—As the school plant becomes flexible it offers many possibilities. Rooms are no longer fixed spaces, since they have multiple use in providing large areas for group meetings, rhythmic expression, constructive activities, and also smaller areas for class work, conferences, discussion groups, research groups, and the like

Left—As the school becomes a place where nature is worked with, children deal with plants, animals, insects, aquatic life, etc. Rocks, soil, fertility and care of plants reveal natural phenomena through which science is studied. The school grounds are resources to children

Right—When the school grounds and environment offer opportunity for landscaping, erosion control, gardening and the like, children have the opportunity to attack problems for which they can test results as they build their program

Below—In place of classrooms of a uniform plan, entire sections of a building may be planned to become available for large groups to work on such things as planning and adopting a program, receiving reports from committees delegated to be responsible for services for the entire school community, etc.

on different parts of the program. Groups may be active without the teacher's being constantly present. Rooms, work areas and storage spaces seem to be more useful as they are less rigid, less uniform and less available for one use only. Physical movement is freed as room spaces are more flexible and varied. The determining philosophy tends to indicate the need for work areas as varied and usable as the kinds and types of living the program of education tends now to provide for.

Resources Are More Than Spaces

As resources are thought of in a more complete way, the need for the artistic element becomes evident. Well-designed buildings permit a more complete release of the individual in what he is undertaking. Beauty is not in just being attractive; it extends to being intriguing. Stage arrangements, spaces for rhythmic interpretations, audience arrangements with stage plans which permit natural and large group use, may be parts of the esthetic planning of the school building.

Color tones which depart from the traditional "school brown" add something to the release of children, in addition to being esthetic in themselves. The philosophy of school planning indicates that resources may be equally valuable in color, arrangement, spacing, and design, as much so as in the furniture, books and equipment.

Permitting Children to Plan

Still another influence on the school planning is in the movement towards permitting the children to initiate each year a school program which expresses their group living and to attack problems which are real to them.

As the curriculum in the elementary school permits greater flexibility and choice of decision on the part of the children, the school planning will attempt to permit more opportunities for children to do in a unique way things that seem important to them. Such a plan sees information, skills, procedure attacks on problems, as the means selected because there is something vital and compelling to be attempted. Exciting problems selected may be dealt with through ever-so-many different attacks. The means selected should be somewhat controlled by the choices of the children. School planning of building and resources, in the philosophy as now emerging, allows for many ways of dealing with the same problem. It thus becomes important for the school planning to allow for the greatest diversity of use of the school and its grounds as resources. A more rigid, formal school planning perhaps yields the least in this direction. There is some basis for believing the school building should permit the program of education to be remade by each group of children who carry on the acts of living that make the curriculum of the school. Each year might carry diversity rather than fixed uniformity as a program of education.

Community Conditions

The elementary school planning should more fully take into account all the community resources, including traditional beliefs, economic conditions, adult participation, curriculum outlook, teacher vision and others. The problem becomes that of finding a solution which more adequately satisfies all the elements, and less a matter of some right answers independent of the situation being served. The philosophy that enforces right answers is not in the direction of solutions which are supported by, and emerge out of, the data conditions found in the community dealt with. The school planning should exemplify the democratic philosophy supporting the program of education for the children.

Summarizations

1. The emerging philosophy that undertakes to see the nature of a person as an organic maturing person indicates that the school program shall be built around the idea of growth and development with the use of subject matter as the means to its attainment. School planning will correspondingly be thought of as providing for buildings and grounds and equipment to be resources in this process.

2. The tendency to distribute buildings by using smaller units may profitably be expected to take the place of centralized buildings with large numbers of children under the same roof.

3. In addition to the adequate size of sites, the character of them becomes important as resources in the program of education which looks upon all such materials as means necessary for the growth of children.

4. The way school planning looks upon the program of education will largely determine whether the school building is thought of in isolation or as a necessary means in the development of the plan of education.

5. As school planning more adequately takes into account the relationship of the building and grounds as resources, the more necessary it will be to plan school construction in terms of the program of education that is emerging in the philosophy and psychology now most promising in the outlook for these fields.

6. School planning is first of all an educational problem and then an architectural and engineering problem.

HOW TO AVOID WATER LEAKAGE IN SCHOOLHOUSES BY PROPER ROOF AND WALL FLASHING, FOUNDATION WATERPROOFING, AND ROOF DRAINAGE

By HENRY E. VOEGELI

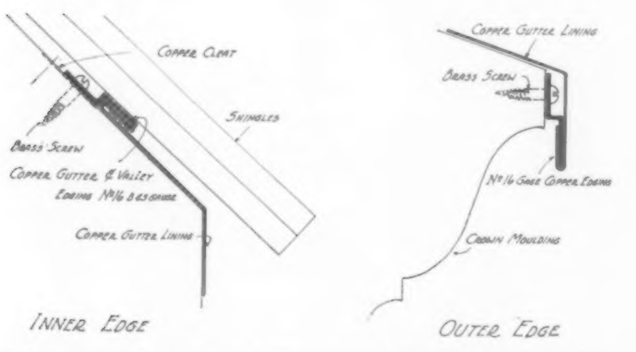
Development Engineer

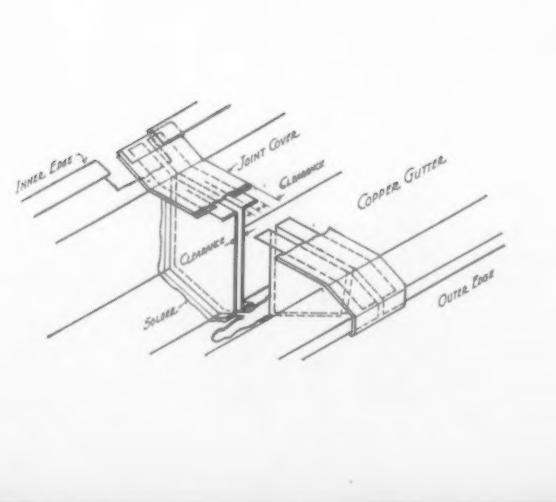
IN the design of school buildings, utility and architectural beauty are of first importance. Next, although sometimes neglected and yet deserving of careful attention, is the selection of materials and methods of construction that will assure at least 25 years of good service at a minimum cost for maintenance. Therefore, of equally great importance is the matter of waterproofing and damp-proofing.

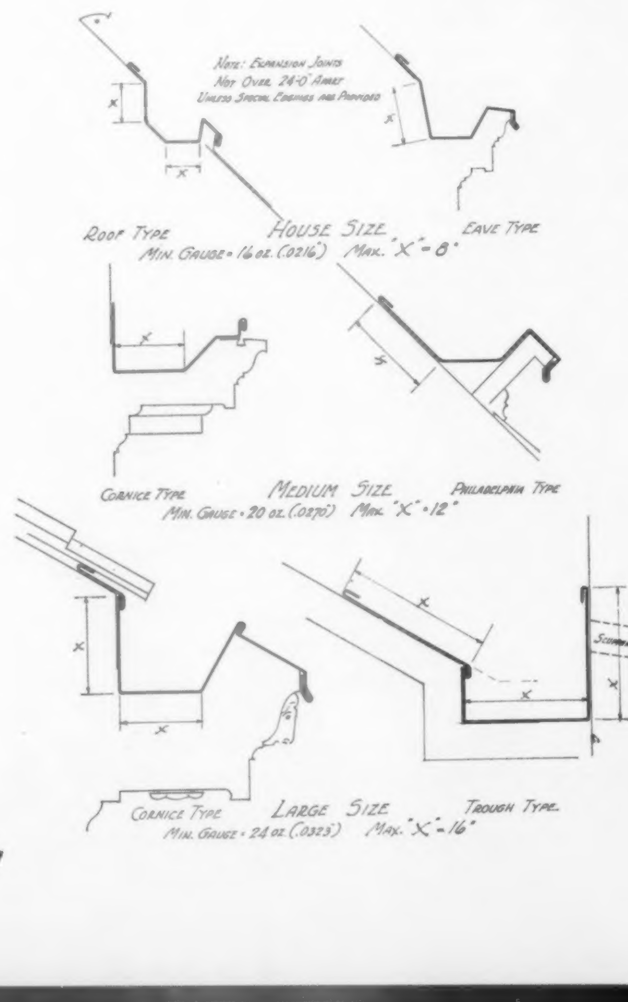
It is probably true that most of the troubles with school buildings can be traced to the penetration of water or moisture. The points of entry are usually at one of the following: the roof; through the walls and foundations; more specifically at built-in gutters; through large architectural chimneys; at valleys and flashings of sloping roofs, as well as at flashings of flat roofs. At the walls, and particularly in walls of masonry, water will find its way to the interior by actually penetrating the brick, artificial stone and mortar, and of course it becomes especially troublesome at window heads and sills, including horizontal planes, such as copings, offsets at water tables and belt courses. Unless the ground below and surrounding the building is dry and allows free drainage, or, if drainage of ground water has not been provided for, the water and moisture that enter through the foundation and the basement floor will be a prolific source of trouble.

Problems and Solutions

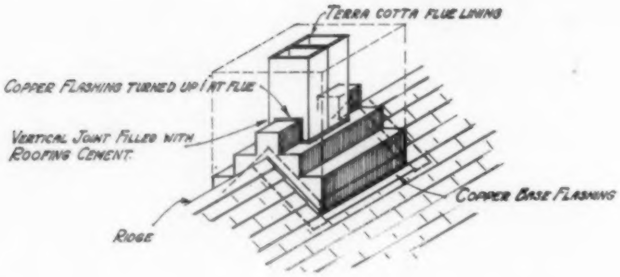
Sloping Roofs.—Aside from the deterioration of cheap roofing materials, one of the outstanding problems is the built-in gutter, which naturally must be lined with a watertight material. Galvanized iron, or copper, is usually employed for the purpose. With the former, the tendency toward destruction by rust







Details of built-in copper gutters. Above—Gutter fastenings. Below—Expansion joint in gutter. Right—Details of free sliding gutter edges



Chimney flashing

is a negative quality and a common cause of trouble, and, with the latter, the difficulties are quite often due to lack of understanding on the part of the designer or sheet metal worker as to the nature of the metal. Improper installation and insufficient provision for expansion and contraction result in faulty work which is, in some cases, almost impossible to rectify. These conditions could be avoided by following a few simple rules, as, for instance, designing the gutter for stiffness and providing adequate expansion and slip joints. Gutter outlets should not be over 24 feet apart, and there should be no plain surface of 16-ounce copper more than 8 inches wide. In no case should nailing through the sheet or soldering of the seams be permitted except in the trough of the gutter, which may actually contain water.

Valley flashings are of two kinds; namely, for open valleys and closed valleys. The latter, although quite efficient and economical, has limited use because it is practicable only in valleys of roofs on small buildings. Roofs of low pitch, requiring wide valleys or having long slopes, make closed valleys unsuitable.

Open valley construction is necessary where a large volume of rain-water is likely to accumulate suddenly, as, for example, on large roofs with expansive slopes, and particularly if the roof pitch is relatively low. The main reason is that the valleys must be wide to hold such a heavy flow, and of course the shingles must be kept a safe distance away to avoid piercing the metal valley lining with the nails that fasten the shingles.

A more or less common problem with open valleys, especially with those having a copper lining, is that of line corrosion, which occurs directly under the edges of the shingles where they lap over the copper along the rake of the valley. The danger can be minimized by canting the ends of the shingles upward at the valley so that water will not hang by capillarity between the copper and the underside of the shingles. This may be accomplished in many ways, the most common method being to insert a strip of tarred felt along the edges of the valley flashing, so located that the points of the shingles will extend about 1 inch beyond the strip and rise up at least ¼-inch so that the rain-water, together with any sulphurous matter that it collects from the surface of the roof in its downward flow, will not be able to stop and remain there owing to capillary action. Line corrosion is not usually a serious problem, but in localities where the action is accelerated by atmospheric conditions, copper of at least 20-ounce gage should be used. As an additional precaution, it may be wise to apply one or two coats of good paint. Such valley lining if painted every five years should last a long time.

Chimney flashing, if improperly done, is almost certain to develop into a bad condition, particularly with large architectural chimneys. Large chimneys present a broad exposure to the weather and driving rain, and since chimneys of masonry are quite absorptive, the rain-water, after saturating the masonry, may flow into the building. This has often occurred on work where chimney flashings have simply been tucked into the masonry about 2 or 4 inches. From experience with installations of this kind, it is now becoming standard practice to carry the flashing entirely through the masonry and to turn it up about 1 inch against either the inside or the outside surface of the terra cotta flue lining.

Flat Roofs.—It is admitted by those who are most experienced in low-pitch or flat-surface roofing with tarred felt or other composition materials that the flashing is the weakest part of the roof. For this reason, the flashings of a 20-year roof are usually guaranteed only for 10 years. Felt or fabric flashings, if properly installed, have a definite length of life, usually ranging from about 10 to 20 years.

Metal flashings are preferred because of greater durability, and the selection is very wise if the work of installing is well done. Unfortunately, occasional troubles have arisen when the metal was not handled intelligently. Probably the chief fault in the application of metal base flashing is due to the tendency toward using high flashings, reaching a considerable distance up the parapet. This is done because the metal seems to have stiffness enough to support itself. Because of the buckled and wavy surface that develops, this produces cross-splitting and other undesirable results. Furthermore, the difficulty is augmented by the necessity for making watertight soldered joints between the pieces of flashing. On long buildings, this condition is quite sure to become troublesome.

Limiting the size of the base flashing is the best safeguard against such troubles. With copper, the upstanding leg should not be greater than 8 or 10 inches, 6 inches being safer. The horizontal leg of the base flashing extending onto the roof either 4 or 6 inches is considered good construction. All end

joints should be locked and soldered except at expansion joints of the building. Copper of cornice temper is preferred for this purpose.

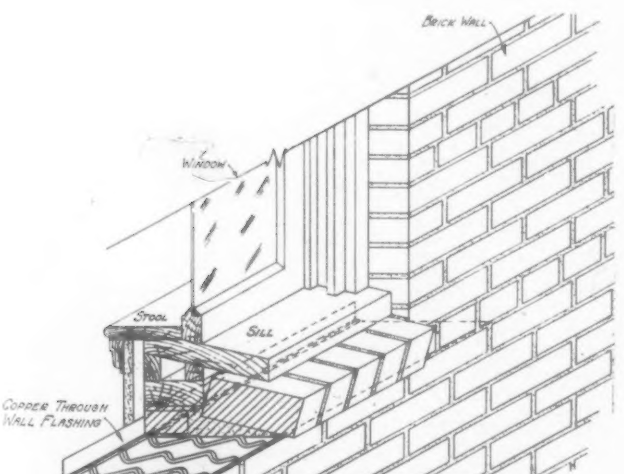
Window Heads and Sills.—Of the locations that have been most neglected, and for which there is hardly a satisfactory remedy if not properly flashed, window heads are probably outstanding. To omit flashing is a serious mistake, but to include it is wise, relatively simple, and inexpensive.

Foundation Waterproofing.—In wet ground, the basement for every building should be waterproofed so as to be healthful to people and to provide a proper place for furnishings and other materials. In addition to the many advantages that are inherent in a good job of waterproofing, a basement treated in that manner is also automatically termite-proof.

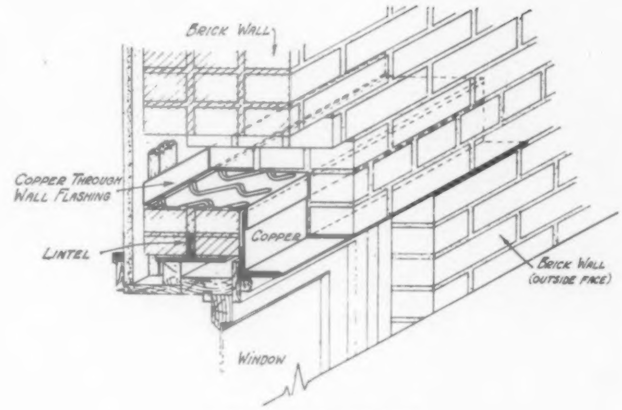
Membrane waterproofing is acknowledged by many as being the most reliable system. The only improvement that might be added is the introduction of at least one ply of thin copper in building up the waterproofing.

Masonry Wall Flashings.—Masonry walls, even if built with the best of care, may prove to be a problem from the standpoint of water penetration unless they are properly flashed.

Copings, as the name implies, are intended to serve as a capping for brick or stone walls to shed water. They are usually of artificial stone, but in some instances of monolithic concrete, terra cotta, or natural stone. Artificial stone copings which are furnished in lengths of about 4 feet and laid with square-cut butt joints have two characteristics which make flashing imperative. One is the absorptive nature of the material, which allows penetration of water. This condition increases as the stone ages, even if waterproof-



Window-sill flashing

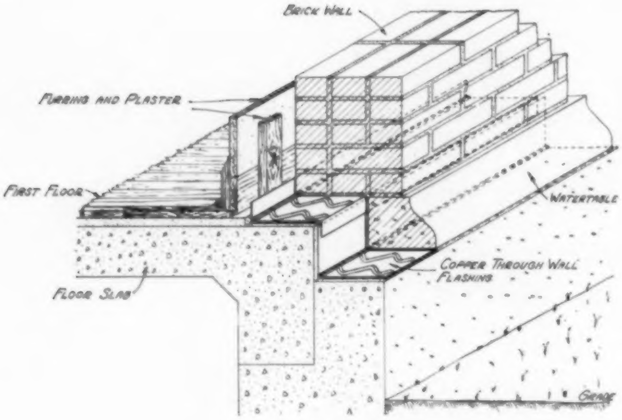


Window head flashing

ing compound is added to the mixture when the stones are cast. The other is the impracticability of making butt joints in masonry copings permanently watertight. Copper through-wall flashings is a proper and effective complement to correct coping construction.

Parapet walls is the name of the portions of exterior building walls that extend above the roof level, forming a guard-rail, as well as providing a suitable architectural crown for the building. Parapets and copings should receive the utmost consideration in regard to flashing, because that is where driving rain seems to have its greatest effect. One may observe that parapets soon become darker than the main building walls when it rains. This is due to saturation with water that comes down through the coping or to that which falls or is blown against either face of the parapets. This saturation is hastened when the rain is accompanied by high wind, and occurs much sooner above the roof line because the wind has a double effect by blowing against one side of the wall and drawing it through by suction on the other side. Attempts have been made to cut out the draft or suction effect by sealing the roof side of parapet walls with plastic and roofing felt, but this has been proved unsatisfactory because of mildewing and disintegration of the masonry due to lack of ventilation and continual soaking in water. A better method of treating that situation is to sheath the back of parapet walls with sheet copper, either plain, crimped or fluted. There is ample proof in existing installations of this sort that the necessary ventilation or breathing is provided for and that the purpose of reducing water penetration is satisfactorily accomplished.

Spandrel beams are the structural members in skeleton frame construction which carry the exterior walls from story to story and which in turn transmit the load to their respective vertical supports or columns. For obvious reasons, the strength and good condition of these spandrel beams must be preserved. For this



Water-table flashing

purpose, various kinds of spandrel waterproofing have been developed which protect those beams and keep them dry. Naturally, the most suitable waterproofings are those in which copper is used, either plain or in combination with other materials.

The water table is an architectural detail usually located at about the first floor level. It generally consists of a 4-inch offset in the exterior wall line which increases the wall thickness at the foundation and is designed in that manner for apparent as well as actual stability. Every offset or horizontal plane allows rain-water to tarry on its downward course, and this permits the forces of wind, capillarity and absorption to come into play, with the result that water and frost will soon produce a condition that will make for expensive maintenance. By means of through-wall flashing, the water which permeates the masonry at the water table, and at other similar locations, can be intercepted and diverted out of the wall.

Leaders and Gutters.—Roof outlets and conductors for flat roofs are not likely to produce trouble if the work is properly done, but with sloping roofs, having outside gutters and leaders, experience in general has been quite different, especially in cold climates. The principal complaints are traceable to complications produced by ice and snow.

A common fault with hanging gutters lies in hanging them too high so that sliding snow will tear them away. Of course, hanging them too low detracts from the usefulness of the gutter. The compromise of setting the outer bead of the gutter ½-inch below the line of the roof seems to be quite satisfactory.

Built-in gutters, because of precedent and convenience in construction, are usually located directly over the exterior walls and away from the relative warmth of the attic. This is conducive to troublesome ice conditions and the backing-up of water. If the gutter is located where it will benefit from the warmth of the attic, and if a copper apron is provided between the gutter and the eave, an important maintenance problem will be ameliorated.

Rain-water leaders, when carried down inside the building, are quite safe, but outside leaders in cold climates sometimes become frozen solid with ice, which consequently disrupts the system of drainage and occasionally results in damage.

When the design permits, the gutter should be located where it will have the same temperature as the roof, and the leaders should be brought down inside the walls of the building, connected to the storm sewer or led out through the foundation wall below frost line to suitable dry wells.

If the leaders are to be on the outside for decoration or economy, and if there is to be a built-in gutter, an apron should be provided, as mentioned above, so designed that if the downspouts leading from the gutter to the leader heads should freeze up, the gutter would overflow onto the apron without serious harm. Outside leader and gutter construction is the most popular at present, probably because it is the least expensive. There is not sufficient reason to change the practice even if the leaders and gutters should become clogged with snow and ice a few times a year. However, the introduction of a few refinements over some of the present methods might be profitable.

DESIGN AND EQUIPMENT OF SCHOOL HEALTH SERVICE ROOMS

By JOSEPH G. MOLNER, M.D., M.P.H.

Director of School Health Service, Department of Health, Detroit, Mich.

PROBABLY one of the most neglected facilities of a school is the health service room. This statement, in general, applies not only to the rural schools, but also to many of the small urban and larger city schools.

Altogether too frequently the school health room is of a temporary nature and shares with some other activity the available space. In one instance familiar to the writer, the school health service was housed in the home economics room. Even as quarters for the teaching of home economics, the room was inadequate and the limited bits of medical equipment, so necessary, were interspersed with pots, pans and sewing machines. Many of these temporary health service rooms, and at times rooms allocated to school health work, are poorly situated and not conveniently accessible to the children, the nurse, the doctor and the teacher. In addition to being inadequate from the standpoint of space, the room is frequently poorly lighted and ventilated.

Location and Layout

A health service room in a school should be centrally located so that it will be easily accessible to the greater portion of the school population. From it the administrative office of the school should be easily accessible to the pupil, the doctor and the nurse. In larger communities where heavy traffic and street-car lines create unusual amounts of disturbance, the location of the health room should be such as to reduce extraneous noises to a minimum. This stipulation applies also for the reduction of noises created within the building by pupil traffic between classrooms, and noises emanating from the school shop or gymnasium. The reduction of such noises is of the utmost importance, particularly when the physician or the nurse is testing hearing and when the physician is performing auscultation tests of the heart or the lungs.

The room should be large enough to allow for a generous amount of furnishings, adequate ventilation, and freedom of motion. Far too frequently the school health rooms are entirely too small. At least one dimension of the room should be 20 feet or more. This would allow for the direct testing of hearing and vision—tests which are performed at a distance of 20 feet.

Adequate ventilation and lighting are of the utmost importance. If possible, the room should have windows on at least two sides. If the windows are large, as a rule they will admit sufficient light to allow daylight testing of vision. There should be a sufficient cross-current of air to keep the room comfortable.

In addition to the health room proper, there should be an adjoining waiting room, the size of which would be governed by the population of the particular school and by the number of children that are sent to the school health room for service. It is quite necessary that such waiting-room facilities be made available, because a child should not be asked to wait in the health room while another child is being treated or examined. This is inconvenient for the examiner, frequently embarrassing to the child who is being examined, and certainly disconcerting to the child who is waiting.

Equipment

The equipment of a school health room should include a wash-bowl with running hot and cold water, equipped with foot-pedal or knee-controlled valves. This additional equipment is not essential, but we have found it desirable. There should be a liquid or powder soap dispenser and a paper-towel rack conveniently located near the sink. A hand brush can be a very valuable piece of equipment.

There should be a desk and a table in the health room. A single pedestal desk is usually adequate, and a well-constructed table no larger than the average-sized kitchen table will usually suffice. The desk top and table top should be of a composition material which can be easily washed. Three or four chairs, in addition to the desk chair, are desirable. File-space of adequate volume and proper size to handle the health records is a very necessary item. In these files should go records of current examinations, records of follow-up of defects, accident reports and the like. A locked cupboard or metal cabinet for supplies is very desirable, and a telephone is indispensable.

In many instances health workers have found a bulletin board in the health room or in the waiting room of great value. On the bulletin board can be placed health posters, current health information, records of accidents in the school and sickness in

general, the incidence of communicable disease, and other information which the health worker or the principal of the school considers pertinent. These other bits of information might include the protection level of the school population against diphtheria and smallpox.

It has also been found convenient in numerous instances to include among the furnishings of a health room a rack or some other type of container for literature pertaining to health. The literature thus placed on display is freely distributed to the school children and the parents.

There should be a cot in the health room with one or two blankets and a pillow, and a folding screen to shield the cot. This equipment is invaluable under emergency situations, as, for example, when a child is taken acutely ill or is seriously injured and needs to be placed at rest while waiting for transportation or for further first aid or medical care. There should also be a good-quality upright scale with a measuring rod, a full-length mirror, and a covered waste can with a foot-pedal.

A Snellen eye-testing chart is indispensable. An ordinary printed Snellen chart is the simplest type of device, and in most instances quite adequate. However, an electrically lighted Snellen chart is far more desirable, especially for early morning work and on dark days.

The standard twenty-feet distance used for the testing of vision and hearing should be painted on the floor, and should be permanent. Beginning at the chart, markings should be spaced one foot apart for the first ten feet, and for the remaining ten feet they should be spaced five feet apart. These markings can conveniently be used for both hearing and vision testing.

PLANNING TEACHERS' SERVICE FACILITIES

By ABEL HANSON

Superintendent of Schools, Carrollton, Ill.

AN interested school administrator was being shown through a new school building in a large American city. Proudly his escort called his attention to a teachers' lounge. Upon entering, it was apparent that the suite was but partially finished. However, the floor plan provided a large central lounging room, a separate toilet and wash room, and an adjoining kitchenette. Being impressed, the visitor asked his escort, who was one of the local teachers, "What plans do you have for decorating and furnishing these rooms?" The answer came back promptly, "Oh, we have nothing to say about that." In other words, here was a suite of rooms included in a new structure, supposedly to serve the needs of the twenty teachers employed there, and they had in no way been consulted in its planning. Nor was there any indication in the escort's answer to the visitor's question that the teachers were interested in sharing the planning of their own lounging suite.

The narration of this incident is intended to introduce a fundamental question: Who should be consulted? Who should share in the responsibility of planning teachers' service facilities?

Teachers Should Share in Planning

It would seem obvious to even the most casual observer that efficient teachers have studied and are thoroughly acquainted with their own needs, and that they should be keenly interested in the satisfaction of their needs through shared planning of school facilities. Further, in view of the modern emphasis on democracy in school administration, it would seem that teacher participation should be actively sought by school administrators, and that maximum cooperation should be freely offered by the teachers in all possible phases of building planning, including teachers' service rooms and facilities.

Too often in the past provision for teachers' service has been an after-thought. A teachers' room, or suite of rooms, was simply worked into a space which was not otherwise allotted and needed to be filled in with something. There existed no attempt in the planning to relate it to a basic philosophy of education, to the rest of the building structure, or to the studied needs of the teachers.

No single phase of school-building planning has reason for existence except in terms of the educational program being proposed, and teachers' service facilities, like all other units of a building program, should be planned in a manner to contribute to a fuller realization of the inclusive educational objectives set forth in the local situation.

Principles of Procedure

Procedures will vary with the factors in local situations, such as the personnel involved, the specific building to be undertaken, and the type of leadership available. However, certain general principles are commonly applicable and worthy of careful consideration. Suggestive criteria, together with pertinent comments, may be given as follows:

I. Teachers' service facilities should be adapted to the need for effective democratic pupil-teacher relationships.

Many services may be provided for teachers which contribute directly to the teaching process. To plan facilities entirely in terms of the personal needs of the teachers and apart from the many pupil-teacher contacts is contrary to the major purposes of education. Teachers should be provided with:

A. *Secretarial service.*

The time of teachers is too valuable to be spent in a routine of clerical details. Maximally effective teaching is possible only when teachers are free to devote full time to the task. Proper secretarial help makes such devotion possible.

B. *Teaching library service.*

School libraries are most frequently organized on the basis of pupil needs. A more effective plan is to consider library facilities in terms of joint pupil-teacher activities made possible through library materials. Thus, the library becomes an integral part of the school, rather than a separate department which lacks usefulness because of artificial barriers. This applies to books and related materials, shelving, filing, indexing, furniture, room space, location, orientation, and all other factors which together can make libraries really serviceable.

C. *Teaching supply service.*

The same reasoning which applies to library service may also be applied to the area of supply service. Selection, storage, distribution, and use of supply facilities should all be planned in terms of their joint use by teachers and pupils in making the learning process more effective.

D. *The machines and other mechanical devices which add to the effectiveness of the teaching-learning process.*

The increased use of tests and statistical methods, together with the availability of such devices as radio and moving pictures, makes the use of machines imperative. Economy of time, conservation of energy, and more successful teaching may be expected to result from a careful consideration of this criterion.

E. *Facilities for individual conferences with pupils.*

The type of conference being referred to is in addition to the ordinary routine of pupil-teacher contacts in class work which do not require privacy. Many conferences do require privacy and should be so planned that conferring parties will be completely at ease. Special attention should be given to the furniture used for this purpose. A desk and a swivel chair, for example, may set up an artificial barrier between pupil and teacher and prevent the attainment of mutually desirable objectives.

F. *Facilities for group conferences with pupils.*

Classrooms planned with sufficient flexibility in design and furnishings may well serve the needs of group conferences. However, in all cases, the conference table arrangement is much to be preferred over the traditional arrangement which places the teacher in a position apart from the pupils. All barriers to democratic thinking should be eliminated in planning the facilities for group conferences.

G. *Facilities for effective pupil-teacher social relationships.*

Again, sufficient flexibility in the planning of classrooms will make them adaptable to use for the parties and social functions involved in a well-rounded educational program. Teachers should be participants in these activities, not merely chaperons and spectators. Planning of rooms, furnishings, and equipment should be motivated by that conception of activity.

H. *Facilities that assure conservation of energy in the teaching process.*

Teaching school is hard physical labor at best. Improper planning of teachers' services makes it doubly so. In the matter of secretarial help, mechanical equipment, library equipment, supply equipment, and in all other facilities bearing on pupil-teacher relations and contacts, convenience and utility should be points of major emphasis.

I. *Services that contribute to the esthetic in the teaching process.*

Attention to the esthetic in design, arrangement, and location of teaching equipment is a service to teachers as well as to pupils, and through such beauty much can be added to the fullness of educational experiences. Pupil-teacher contacts are considerably enhanced when they take place in an atmosphere studded with applications of practical art.

II. Teachers' services should be adapted to the personal needs of the teachers.

Too often in the past, efforts to improve teaching have been concentrated only on the tasks to be performed. Modern emphasis is that equal attention be given to the persons performing the tasks. Teachers who are well served in their personal needs are better teachers because of the service. Planning for personal teachers' service facilities should proceed coordinately with the other phases of school-building planning. Teachers should be provided with:

A. *Facilities for the safekeeping of clothes, books, keys, records, and all other personal and official effects needing such care.*

Strategically placed, well-ventilated lockers are conveniences to be provided every teacher. For personal valuables and for important official records, fireproof safes or vaults should be placed at the service of the teachers.

B. *Facilities for receiving and distributing mail and official communications.*

Individual key-locking mail-boxes, easily accessible to the teachers, are standard equipment. The importance of bulletin boards of such size, design, and location as to render maximum service to teachers should not be overlooked. Teacher use of these bulletin boards is no less important than administrative and supervisory use of them.

C. *Facilities for dressing.*

Teachers are often faced with the necessity of dressing while at school. In addition to routine changes connected with regular teaching duties, there exist extra-curricular and social needs for such changes. All should be accommodated in the planning of teacher's services.

D. *Facilities for rest.*

Minimum requirements indicate that at least one rest room for each sex be provided in each school building, and that these rooms should not be expected to serve also for social rooms. They may be relatively small, but should be equipped with a cot and located adjoining a toilet. Relaxation should be made possible without disturbance from light, smoke, or conversation.

E. *Facilities for human service.*

Lavatories should be planned for the particular privacy and convenience of the teachers, and should be located in studied relation to other teachers' facilities. Standard requirements should be observed rigidly in the details of ventilation and sanitation.

F. *Health service at school.*

It is a mistaken conception of education which plans school health service for pupils only. As previously emphasized, teachers are no less a part of the educational enterprise than are pupils. Their entire

welfare is of no less importance, and therefore teacher health service should receive attention in planning these facilities.

G. *Opportunity for exercise and recreation.*

To a large extent the same facilities arranged for student use, both indoors and out, may also serve the needs of the teachers, provided the needs of the teachers are considered in the original planning. Rooms designed for teachers' use should have special attention devoted to the recreational possibilities. Recreation has a real contribution to make to faculty *esprit de corps.*

H. *Facilities for reading and study.*

In addition to the standard classroom facilities which may serve this purpose, teachers should be provided with a comfortable place where they may go and be undisturbed for desirable periods of time. Classrooms are always in use for other worth-while purposes. In view of the detailed and careful preparation required for successful teaching, special study rooms are essential. Browsing and recreational reading should also be considered in planning these facilities.

I. *Secretarial service.*

This service was previously mentioned under Section I-A as an aid to pupil-teacher contacts. It is also a personal service to teachers and should be planned as such.

J. *Essential communication service.*

The communication service referred to is between the various rooms used by teachers and between these rooms and central offices. Telephones and radios are standard equipment. Messengers may be necessary in selected areas.

K. *Library facilities.*

The facilities referred to under this criterion are different from those mentioned in Section I-B in that the professional, recreational, and browsing needs of the teachers were not then considered. The administration is not only responsible for making reading suggestions to the teachers; it is also obligated to provide these readings and make them attractively available to the staff.

L. *Storage space.*

Storage space is not to be confused with facilities for the safekeeping of articles mentioned under Section II-A. Many materials are not actively in use at all times. Convenient and orderly arrangements should be included in the planning for the storage of these materials. It is inconceivable that teachers should be forced to store valuable teaching materials with odd collections of junk. Materials having no value should be destroyed as a matter of service to the teachers.

M. *Facilities for the preparation and the eating of food.*

First, adjacent to the school cafeteria, teachers should be provided with a lunch room which permits them to eat together and enjoy the informal exchange of ideas possible under such circumstances. Second, in connection with the lounging and social rooms, there should be provided a kitchenette which permits the preparation of teas and light lunches as such may be associated with the involved activities.

N. *Equipment to accommodate their physical handicaps and peculiarities.*

It is sometimes pointed out that teachers possessed with major physical handicaps are not capable of rendering normal teaching service, and therefore should not be employed. However, if such persons are kept on the teaching staff, every possible facility should be made available to them in an effort to offset the handicaps.

O. *Supply facilities.*

These facilities are a personal service to teachers as well as to the teacher-pupil contacts previously emphasized in Section I-C. They should be planned accordingly.

P. *Such office facilities as are consistent with individual needs.*

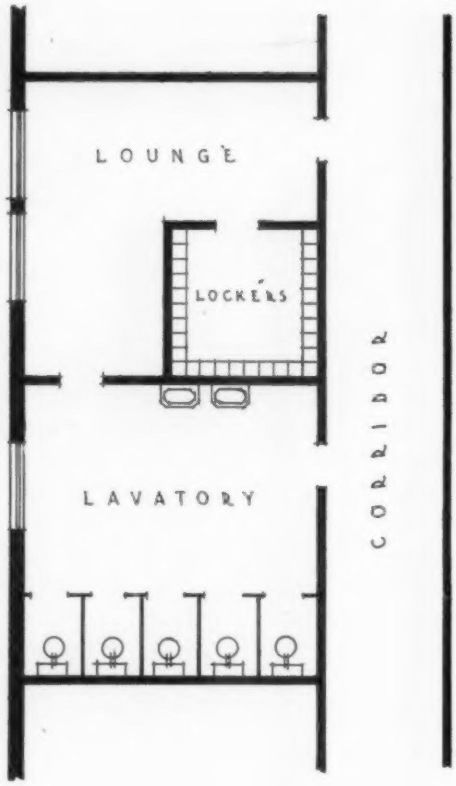
The type of office facilities will vary with the work and responsibilities of the teachers. However, every teacher will have need for selected office equipment, with space and location to suit specific needs. The location of several offices in the same room without separating partitions does not present a desirable situation.

III. Teachers' services should be adapted to the need for cooperative inter-teacher relationships.

Consistent with the generally recognized principle that much can be added to the success of the teaching process by close understanding and cooperation between teachers, definite efforts should be made to that end in planning teachers' service facilities. Covering the entire area of both formal and informal relationships, there exists genuine opportunity for developing faculty morale. Mention has been made previously of the teachers' share in the planning of their own services. In no single phase of the problem is teacher participation more important than in the one now to be resolved into its component services. Teachers should be provided with:

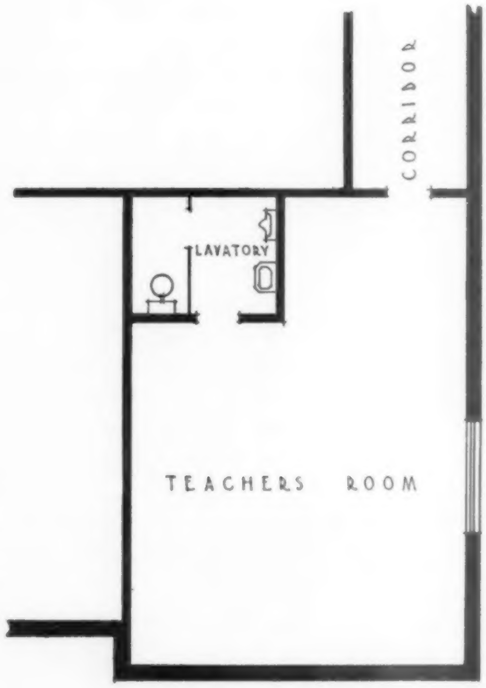
A. *Facilities for social meetings.*

The same reasoning which makes the school responsible for the social activities of the students applies to the teaching staff with equal significance. The opportunities for integrating the faculty through the use of planned social facilities are too valuable to be overlooked.



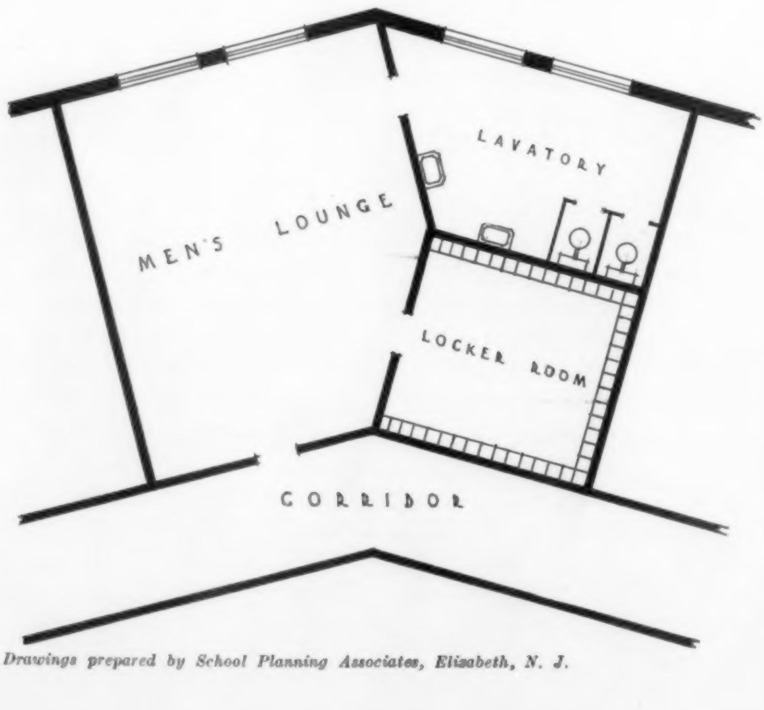
Sketch 1 (at left)

In an examination of the floor plans of many representative school buildings, little evidence was found that planning had been in terms of the actual needs of teachers. This typical example of teachers' service rooms shows the same amount of floor space devoted to lavatory and toilets as is devoted to lounge and lockers. Replanning the unit might devote more space to the lounge, cut down the size of the lavatory, and find sufficient space for a kitchenette. A proportionate distribution of floor space makes possible maximum utilization of facilities



Sketch 2 (at right)

The poorest planning of teachers' service facilities is to be found in old buildings which have been remodeled and reconditioned in an effort to prolong their usefulness. The appearance of this unit is that it was so located in the building as to use up odd space not otherwise assigned. As it was located at the end of a dark corridor, had but a single window, and provided the bare minimum of services, it would seem that the needs of the teachers were not thoroughly explored in the planning. Lavatories should have direct ventilation. State law usually makes this mandatory



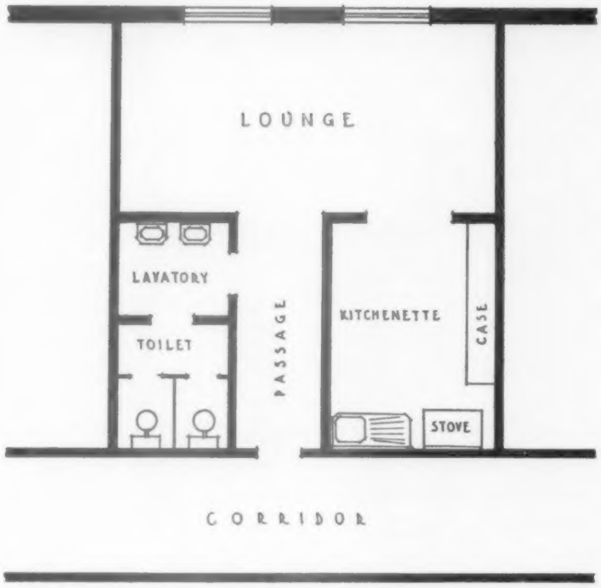
Sketch 3 (at left)

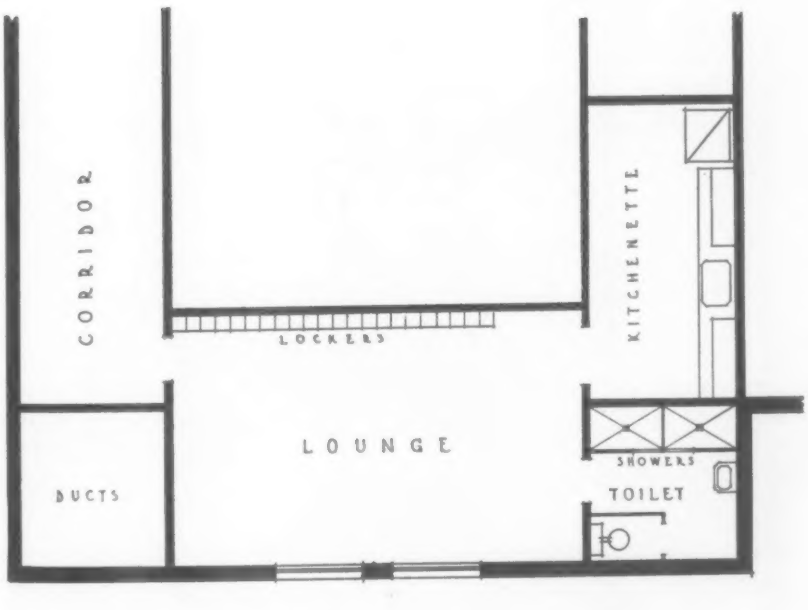
The necessity for using odd-shaped areas of floor space need not seriously impair or lessen the ultimate utility of the facilities provided. This sketch presents a unique arrangement for a men's service suite. It shows planning to meet studied needs and makes admirable use of odd-shaped floor space which could not be used conveniently for general classroom purposes. Ventilation and lighting of the lavatory appear to be especially desirable

Drawings prepared by School Planning Associates, Elizabeth, N. J.

Sketch 4 at right

The desirability of kitchenette facilities, particularly in connection with suites planned for the use of women, is well established. This sketch presents a well-planned unit, designed to meet a variety of the needs of teachers. Individual lockers would add to its usefulness. They might be placed either in the passage or in the lounge. It is noted that the toilets have neither direct natural light nor ventilation. This violates widely accepted building standards and is contrary to law in many states



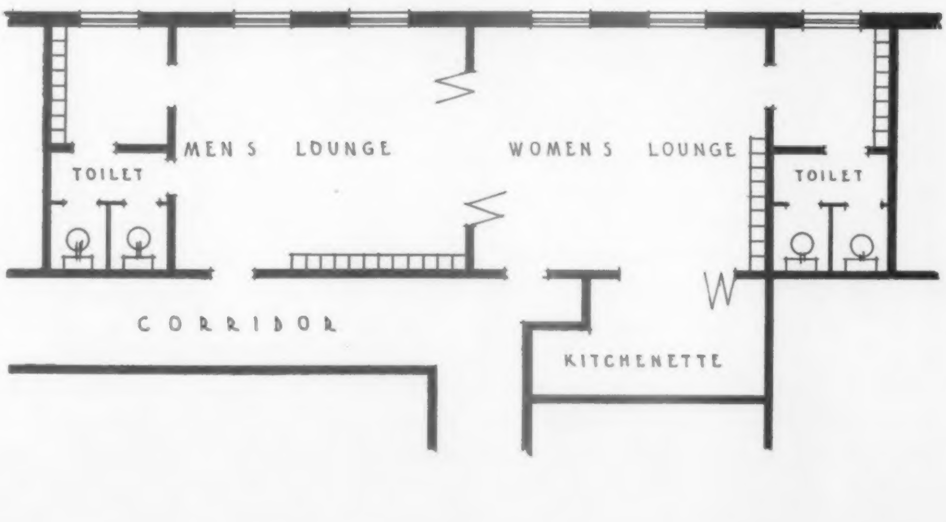


Sketch 5 at left

This sketch presents a novel arrangement of teachers' service facilities and a well-conceived utilization of floor space. The placing of showers in a unit designed for study, lounging, and social meetings might well be questioned. Bathing facilities might be better associated with physical and recreational phases of the total program. However, if showers seemed necessary to the satisfaction of the studied needs of the local situation, they are not to be condemned on the basis of broadly stated generalities

Sketch 6 at right

Here is shown how a portable partition may be used to advantage between the facilities provided for men and those provided for women. By folding back the partition, the rooms provide space for activities of considerable size. Thus, the utility of the suite is such that it will yield a greater return on the money invested



B. *Facilities for individual supervisory conferences.*

Since the supervisory conference is conceded to be the most valuable of the several devices used in the improvement of instruction, it follows that this need should be included in the planning of teachers' services. Provisions for the location and design of these facilities should be such as to conduce to cooperative effort in the conferences. Light shining in the face of a teacher puts her at a disadvantage. Swivel chairs and roll-top desks may be barriers to democratic action.

C. *Facilities for professional teachers' meetings.*

Next to the individual conference, teachers' meetings are the most effective means for the improvement of instruction. Incidental planning of this service amounts to neglect of a major school facility. Special emphasis should be placed on the round-table type of equipment for relatively small groups, while the panel-type is to be preferred in planning facilities for relatively large faculties.

D. *Facilities for teachers' union activities.*

Since the teachers' union is rapidly coming into a recognized status as viewed by both teachers and administrators, facilities for its proper functioning should be included in the planning. In terms of the service the union can render to education, and thus to society, it would be a mistake not to plan fully in that direction.

E. *Recreational facilities.*

Under Section II-G this criterion was emphasized as a personal service to teachers. Its value in developing rapport and morale between teachers is of equal importance and the service should be planned for as such.

F. *Facilities for eating together.*

This service was also previously emphasized in Section II-M as a personal service for teachers. However, it may be that the congeniality which springs from common eating facilities is of even greater importance.

G. *Facilities for the development of an esprit de corps.*

This need is apparent in most of the criteria presented heretofore, but it is mentioned separately because of its fundamental importance to education. Physical facilities, particularly if the teachers share in the planning, have a significant contribution to make in this respect.

H. *Facilities for recognizing that teaching school is a learning situation for teachers.*

This criterion is also implied in many of the other statements of principle. The time-worn concept that a school is a place where pupils go to be taught supposedly valuable things by teachers has played an important part in the total inadequacy of many school buildings. Proper planning of teachers' services is a recognition of the fact that teachers are learning with their pupils, their fellow-teachers, and their supervisors.

IV. Teachers' services should be adapted to the need for cooperative parent-teacher relationships.

It is doubtful that parent-teacher relationships have received any serious consideration in their relation to teachers' services in the planning of school buildings. This presents a strange and inexcusable circumstance when it is generally recognized that understanding between parents and teachers is a prime requisite to successful teaching. At comparatively little additional cost, and with promise of much benefit, the concept should be included in the planning of teachers' services. Teachers should be provided with:

A. *Facilities for receiving individual parents at school.*

A classroom does not always present a desirable situation in which to receive a parent, nor does the traditional office with its roll-top desks and swivel chairs set up an atmosphere which conduces to harmonious attack upon a common problem. A lounging room, with comfortable furniture, a homelike atmosphere, and a cup of tea, may frequently break down barriers and settle misunderstandings more effectively than hours of conversation. Teachers are entitled to such facilities.

B. *Facilities for group meetings of parents.*

These services are usually planned entirely from the point of view of the parents. Since the area is one for cooperative effort, teachers' needs should also be considered in the planning.

C. *Facilities for their social gatherings.*

There exists little justification for the practice of insisting that teachers seek their informal and social contacts outside the school building. Social functions to which teachers invite parents, students, and other friends should be an accepted service to be rendered to the teachers; a service to be considered in the original planning of the physical plant.

D. *Facilities adapted to the need for public appreciation of the school.*

This need is apparent in all the several principles under Section IV, but is presented separately for the sake of emphasis. Public appreciation of the schools can be achieved better when those in direct charge of the schools have many contacts with those who pay for them. These contacts should be both formal and informal, professional and non-professional, and should be given major emphasis in planning teachers' services.

V. Teachers' services should be adapted to the need for correlation and integration with the rest of the physical plant.

Lest the emphasis in presenting these criteria be misunderstood, it should be pointed out that it is not the intention to suggest that the entire school plant be planned about the several needs of the teachers. It is the intention only to suggest the several areas of teachers' service which should be included in the planning of a maximally useful school building. There exists a definite need for a correlation of these needs with those of all other service areas, to the end that greater serviceability and economy may result in the final structure. Teachers' services should conform to:

A. *High sanitary standards.*

B. *High safety standards.*

C. *High standards of fireproofing.*

There exists no justification for the use of double standards in handling such facilities as are represented in Sections V-A, V-B, and V-C. The entire structure should be planned at the highest levels of safety, sanitation, and fireproofing.

D. *Artificial lighting should be of the best available for teachers' services.*

E. *Efficient principles of fenestration should be used in the installation of teachers' services.*

In addition to the standard lighting features adopted for the entire building structure, special devices will be necessary for lounges, offices, and other rooms designed to serve specific needs. The relation of lighting to harmony in interior decoration is also a matter worthy of special study in an effort to contribute to an atmosphere consistent with the particular purposes in mind.

Teachers' services should be:

F. *Properly orientated in the building structure.*

G. *Properly located in the building structure.*

H. *Adapted to the need for conservation of energy.*

The relation existing between Sections V-F, V-G, and V-H above is apparent from observation. The problem of conserving human energy is of building-wide importance. Conservation of teachers' energy should therefore be studied in relation to the entire plan of the building as well as in the facilities designed especially for teacher use.

I. *Teachers' services should be highly flexible.*

J. *Teachers' services should be highly utilitarian.*

Flexibility and utility are closely related in the planning of school buildings. Recent trends emphasize their importance in securing value received for the money expended and in facilitating the socialization of the curriculum. Teachers' services are by no means an exception to this generalization. Rooms, furniture, and all other facilities should be flexible to the extent that interference does not exist with the initial purpose intended, and utilitarian to the same degree.

K. *Teachers' service rooms should be air-conditioned.*

L. *Teachers' service rooms should be sound-proofed.*

It is not an exaggeration to assume that both developments mentioned immediately above will shortly become standard equipment for all school buildings. However, in certain areas of teachers' service they appear to be well nigh indispensable. Rest rooms, for example, should be completely sound-proofed and air-conditioned.

M. *Adequate floor space should be provided for all teachers' service rooms.*

The actual amount of floor space assigned will vary with the size of the building, the number of teachers to be served, the flexibility of equipment, and the peculiar needs of the teaching staff. However, the odious practice to be warned against is the one which assigns left-over and incidental spaces to teachers' services. Floor space assignments to teachers' rooms should be made upon the basis of need and in relation to the other recognized needs to be satisfied in the building.

N. *Teachers' service facilities should recognize the value of the esthetic throughout the area being considered.*

In architectural design, in interior decoration, and in practical utility, school buildings should set outstanding examples of excellence. Teachers' service facilities should conform to these high standards, and, in addition, should conform to the esthetic desires of the teachers as expressed in the planning. It is consistent with good practice to permit teachers to execute, as well as to plan, the furnishings and interior decorations of rooms designed for teacher use.

O. *Teachers' service facilities should set community standards in their respective areas.*

In addition to setting the community standard in the practical use of the esthetic, a school building should also set the standard in many other respects. In fact, each principle presented in the above outline is representative of an area in which the contiguous community might well emulate the degree of excellence maintained in the school. Business organizations, churches, libraries, community centers, and homes should want to copy the beauty, the utility, and the economy to be found there. Teachers' services should conform to these building-wide standards of excellence.

Meeting Local Needs

Thus, a detailed description of plans and facilities for each type of service in this area may be worked out. The suggestions made above do not represent an

iron-clad policy to be followed in all cases. In fact, a much better procedure would be one which permits the local school teachers, under guidance, to develop their own criteria in relation to their own discoverable needs. The major emphasis intended is that those charged with the responsibility for planning teachers' service facilities must proceed in direct relation to the educational objectives of the school and in a sufficiently detailed and deliberative manner to produce results commensurate with the money expended. Many school buildings erected in the past are inadequate to the needs they were designed to serve, because planning for them was not done on a democratic basis and because steps in the planning were inexhaustive and unrelated. In view of the numerous technical helps now available, there exists little justification for inadequacies and errors in school-building planning.

Published Building Standards

One of the most valuable of these technical aids is to be found in the several published sets of building standards. Most of the state departments of education make suggestive standards available to interested parties and, upon request, participate actively in the planning. Many of the larger cities have developed standards in the form of detailed drawings of typical units, such as the typical kindergarten, the typical classroom, the typical science laboratory, and the typical rest room. Although it is inadvisable to adopt and apply these standards without careful adjustment, nevertheless they are highly suggestive of the many details needing exploration in planning a school building suited to the needs of a local situation. Likewise, in certain areas of school equipment, detailed specifications have been worked out, and are making factual contributions to their selected fields. "Public School Plumbing Equipment," by M. W. Thomas, is typical of the material available, and will be found to be especially valuable in planning selected teachers' service rooms and their accompanying equipment.

Perhaps the most significant, and certainly the most inclusive, building standards now generally available are those which have been developed at Teachers College, Columbia University. In these publications are included "Standards for Village and Rural School Buildings of Four Teachers or Less," "Standards for Elementary School Buildings," "Standards for High School Buildings," all three by George D. Strayer and N. L. Engelhardt, "Standards for Junior High School Buildings," by N. L. Engelhardt, and "Standards for College Buildings," by E. S. Evenden, George D. Strayer, and N. L. Engelhardt. In connection with these standards,* there are also available scorecards developed in conformity with the principles outlined in the standards. These devices, growing as they have, out of hundreds of surveys, building analyses, and new plant constructions, possess a high degree of validity, and since each includes sections devoted to the various teachers' service rooms, are particularly suggestive for the area under present consideration.

Inspecting Other Buildings

Another type of help not to be overlooked in planning school-building facilities is visitation, inspection, and discussion of other buildings having reputations for excellence in the particular points of interest. Many persons sharing in the planning will not possess the technical knowledge necessary to comprehend drawings and blueprints, and others will have difficulty in visualizing the materials being studied. Consequently, inspection of teachers' service facilities in other buildings, and detailed discussion of these services with the parties who planned them, will constitute a revealing experience to those who seek intelligent answers to the problems connected with the construction of teachers' service facilities.

Expert Advice Needed

Finally, a significant trend in modern school-building planning is the tendency to seek the advice of educational consultants. Laymen, administrators, teachers and architects all have their distinctive contributions to offer, but in order to coordinate their efforts and to give assurance that the new building will serve the purposes set forth in the statement of need, expert advice of this kind is much to be desired. If drawing building plans and supervising construction are technical tasks requiring the services of trained architects, so, likewise, the analysis of an educational situation and its translation into stated building needs is a task requiring expert guidance and direction. Although this principle applies to the entire field of school-building planning, it is of particular significance in the area of teachers' service facilities because provision for these services is a comparatively new trend in building construction and the educational objectives involved are somewhat more sublimated than in other areas. Experience has demonstrated the educational wisdom and the financial economy of employing educational consultants in all school-building planning.

* Standards are printed by Bureau of Publications, Teachers College, Columbia University.

ELIMINATION OF HAZARDS IN SCHOOL BUILDING

By CHESTER F. MILLER

Superintendent of Schools, Saginaw, Mich.

PLANNING a school building should involve the cooperative study of the community and its needs; the planning of a curriculum growing out of such studies; the educational designing; the architectural designing; and a study of the findings of a multiplicity of experts in specialized fields too numerous to list. Ten years of planning and study was back of our new Arthur Hill High School in Saginaw. We worked on the principle that after the basic planning, safe design is fully as important as the stability of a structure; that safety applied to every phase of the building is largely a matter of planning and can be had with little additional cost.

Children are the greatest resource of the nation. The toll of accidents has made people conscious that the life, safety, and health of school children should be of first consideration; yet, only recently, a nationally known safety organization after an extensive survey stated that the majority of our schools are unsafe.

Planning for safety should include choosing a location which removes children from traffic, from industries, from railroads, from noises and odors, and one of adequate size. Parking areas, orientation, separate service drives and walks, all deserve study from the standpoint of safety.

The Essentials of Safety

In setting up our own criteria in Saginaw, we encountered considerable difference of opinion among authorities as to what constitutes safety. Of help were the National Fire Protection Association's Building Exit Code; the building code of the National Board of Fire Underwriters; the recommendation of the National Council on Schoolhouse Construction; state and municipal codes; recommendations of the American Standards Association on Lighting; the National Advisory Council on School Building Problems.

In initial instructions to architects, we listed the various safety factors we desired to have embodied in the building. As the plans progressed, each decision was conditioned on the question, "Is this the safest way we can do it?"

The accident record in school buildings is the best index of the places where hazards should be studied and eliminated. Corridors, stairways, classrooms, and auditorium contribute 35 per cent of the school-building hazards; gymnasiums, pools, and lockers are responsible for 41 per cent of building accidents. A further breakdown of the direct causes of these accidents serves to locate the hazard.

Securing Traffic Balance in the Building

One of the first and most difficult and essential studies is the layout of the classrooms and central units to get traffic balance. Many accidents result from congestion hazards. In "zoning" the building, we made numerous theoretical studies of traffic movement at each period of the day. Studies of the election of subjects over a period of ten years were made; they were then reconciled with the new curriculum prepared by committees of teachers under expert guidance. Planning traffic balance and verifying its results in actual practice are the most fascinating elements of the entire educational plan.

We moved into our building at mid-year. Every child had received a program and a building layout. Ten minutes after classes were called, every child was in his place. When classes are passing, one can stand in any section of the building and find the same density of traffic with no congestion at any point. All this would have been only accidental without planning.

Fire Protection

Protection of children against fire is undoubtedly the first consideration. The causes of deaths in sixty school fires in public-private schools and colleges between 1903-1938 offer suggestions:

Cause	*No. Deaths*
Inadequate exits	309
Exits cut off by fire	43
Exit doors open in; windows barred	36
Suffocated while asleep	28
Fire-fighting and salvage	25
Burns and ignition of clothing	9
Special hazards (New London gas explosion)	307
Miscellaneous—no data	70
Total	827

The first step is to plan a building as fireproof as is economically possible. There should be at least a four-hour fire rating for exterior, bearing, and fire walls, columns and girders supporting walls; a three-

Above—One of the four long corridors, approximately 600 feet in length, showing how corridors are entirely clear of obstructions and hazards to pupils. Note recessed doors. The halls as well as all other parts of the building are acoustically treated

Right—A stairway and landing. Note the handrails

hour rating for other walls and girders, beams, floors, roofs and floor fillings; and a one-hour rating for partitions. The fire ratings of the Underwriters Laboratories, Chicago, and the recommendations of the Bureau of Standards, Department of Commerce, Washington, D. C., are excellent guides. We have found it helpful to have building insurance experts check our plans, not only for safety suggestions, but for changes that would insure the lowest insurance rates. Over a period of years, large savings can be made if the building is constructed to secure the best insurance rating. Fire marshals called many safety precautions to our attention.

Automatic controls on heating devices against overloads, explosion, and fire were required. All stairways were constructed of concrete and terrazzo, fully enclosed underneath to prevent the storing or collecting of any combustible materials. With the exception of doors, floors, and some window frames, there is no combustible material in the building. Aluminum trim was used for blackboards, metal trim throughout, and a sanitary tile base.

It has been demonstrated recently that even in a fireproof building fires may develop where smoke and certain gases collect in halls and stairways, which may result in suffocation. Proper fire doors or stair enclosures are necessary to guard against this hazard. The question of exits and exit-size is easily determined. The National Fire Protection Association has studied this problem for over 25 years. It is unnecessary to quote its recommendations, which are easily obtainable on request. In our building an exit is visible from any point in the corridor, and not more than 100 feet from the door of any classroom. Fire extinguishers and fire hose are accessible within 100 feet of any place in the building and recessed in the corridor walls, with other stations in the auditorium, on the stage, in the gymnasium, cafeterias, kitchen, and such special rooms as laboratories, shops, etc., within 50 feet. The heating plant is located in a

separate building 100 feet from any part of the main structure. The projection booth is vented to the outside, and all openings automatically close in case of fire. Fire-alarm signals separate from the regular signaling system can be sounded at stations spaced 100 feet apart throughout the building and are in turn connected with the city Fire Department. All draperies, curtains, and hangings are fire-resistant.

Corridors—Stairs—Exits

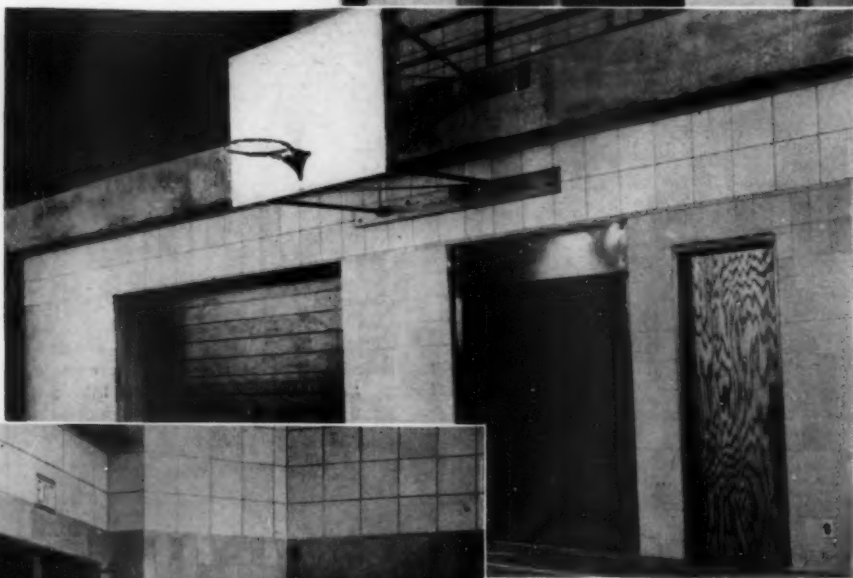
Twenty per cent of school accidents occur in corridors and on the stairs; therefore in this building all corridors are so planned that at least one exit is visible from any point. Pockets were eliminated from entrances, halls and corridors, so that in case of panic children would be forced out of the building by pressure from the rear. At all entrances, mats are recessed flush with the floor and there are no thresholds. Safety devices, such as lock-down panic bolts, hold-open arms, and long door pulls, were provided for all exit doors. Corridor floors, steps, locker, and shower-room floors are of non-slip terrazzo treated with alundum. Stairs are of the full sanitary type equipped with panic rails of special hand-hold design. Balustrades are treated with devices to discourage sliding. All stairway landings are especially well-lighted by natural light.

There are no projections or recesses in corridors and on stair-landings. Lockers, drinking fountains, lights, fire extinguishers, hose cabinets, exhibit cases, waste receptacles, fuse cabinets, bells, gates, ticket booths, telephone booths, etc., are recessed in breather walls flush with the corridor walls. Special reflectors recessed in the corridor ceiling throw light directly on the lockers, so that a student does not throw a shadow on the locker combination or locker contents. Doors are hung on the room-side or inside the breather wall and swing outward so that the open door does not project in the corridor to interfere with traffic. Corners are finished in "bull-nosed" tile.

Left—One of the side entrances, combining safety with beauty and simplicity; note the interesting use of glass blocks

Below—A corridor view, showing cut-off grill used when only a certain section of the building is in use; to the right of the grill, a waste receptacle is concealed in locker

Right—A section of the gymnasium showing apparatus, piano, and victrola storage recesses (open)



Left—A section of the gymnasium, showing apparatus, piano, and victrola storage recesses (closed)

Above—A section in the gymnasium, showing flush drinking fountains, fire alarm, cold-air registers, and emergency fire equipment

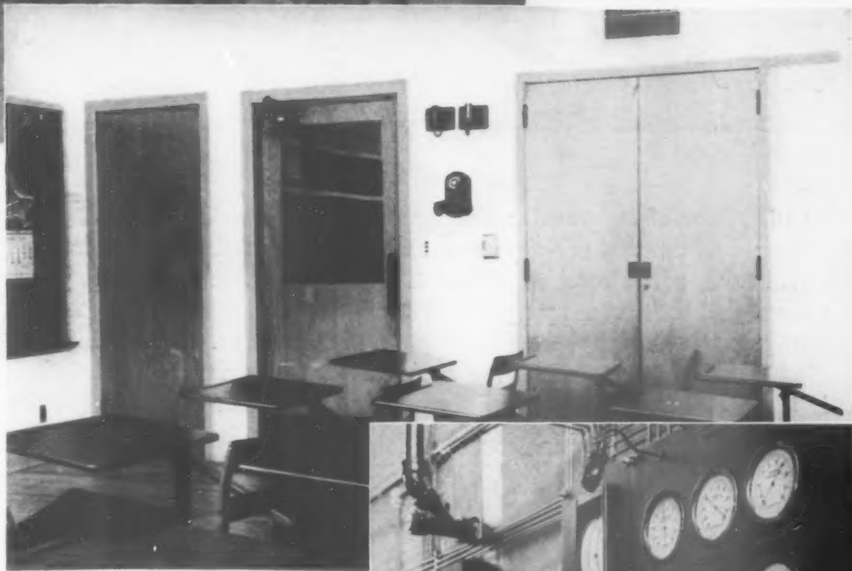
In the Gymnasium

Since one-third of all school accidents occur in the gymnasium, every effort was made there to avoid projections and other possibilities of injury. Recesses behind flush screens accommodate pianos and mechanical talking machines. Windows are fully screened with swinging screens easily opened from the inside. Folding doors are electrically controlled with a key release. Flush doors house all equipment under permanent bleachers. Lights are recessed in the ceilings; all glass in doors is safety glass. Drinking fountains, cuspidors, and fire equipment are all recessed flush with the wall. On three sides of the room, bleachers are of the fold-up type with no projections. Locker-room, shower-room and drying-room floors are of non-skid terrazzo. Benches are fastened securely to the floor to avoid accidents from upsetting or blocking normal paths of travel. Lockers are bolted to a 6-inch terrazzo cove-base to avoid overturning. Lights are protected with tamper-proof guards. Radio, clock, and bell equipment was specified as moisture-proof. Hair driers are recessed in the wall with only the control accessible to students. Showers are thermostatically controlled to avoid scalding.

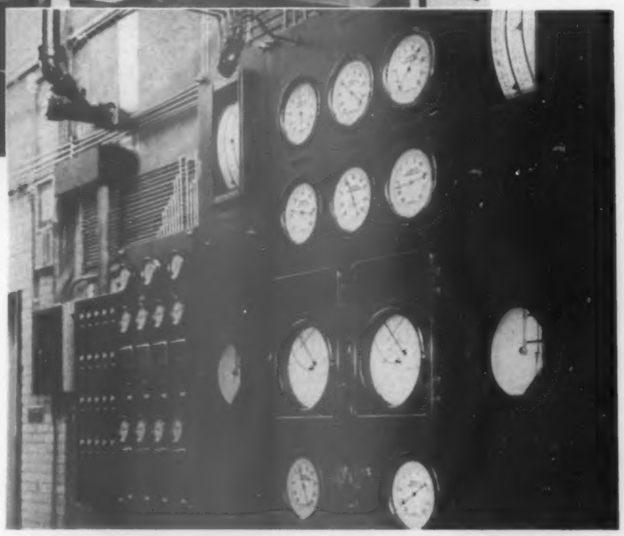
In Classrooms

Thirteen per cent of school-building accidents occur in the classroom; therefore the inside of all classrooms

Left—One of the standard classrooms, showing storage closets recessed in breather walls, covered by flush doors



Right—The classroom exit door, showing room-control panel, containing electrical eyes, telephone, light switch, thermostat, and flush push-plate. This entire side of the room has cabinets recessed in the breather wall with flush doors and no protruding hardware



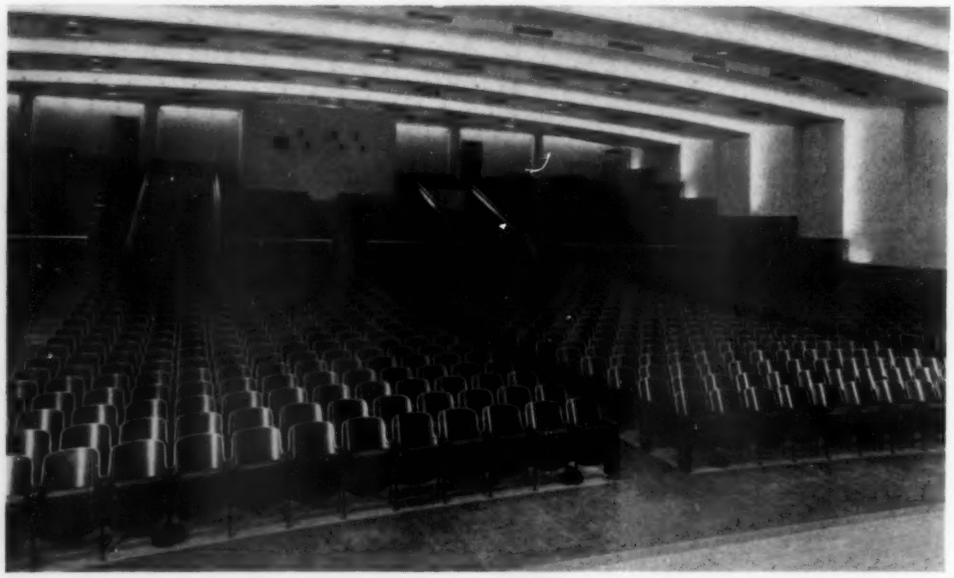
Above—The instrument board in the engine room for remote control of all heating motors and temperature controls

was designed without ledges, both for safety and to prevent collection of dust. The trim is of metal with edges rounded, and the base is of the full sanitary tile variety. Room doors are provided with clear glass to avoid bumping accidents. Room doors are also provided with locks of such type that any locked door may be opened from the inside. Door pulls are used instead of the usual knobs, with only a push-plate on the inside. Doors are equipped with both closers and hold-open arms. There are no thresholds.

Room cabinets are concealed behind flush doors. Telephone, light controls, thermostats and similar units are on a central control panel located in the same position relative to the door in each classroom. Separately controlled ceiling lights with special reflectors flood blackboards without glare. All classrooms are accoustically treated.

Other Safety Items

Many other safety factors were incorporated in the building. All motors and picture booth equipment, besides having direct control, can be cut off by remote control at the heating plant. Danger lights give warnings. A small switchboard on the stage operates by remote control the main controls located in a specially constructed room as protection against fire or accident. Exit lights, certain auditorium lights, and corridor lights, are fed from a circuit separate from building lights to assure the safety of night



A section of the stadium-type auditorium from the stage. Heating ducts and light reflectors are alternated in ceiling coves

crowds in case of failure of the regular circuits.

A stadium instead of the gallery-type auditorium was planned, with exits at two corridor levels. There are ten exits from the auditorium proper and three additional exits from the stage.

The entire building and the corridors are accoustically treated, the metal type being used in rooms where moisture is a factor. Rooms are equipped with electric eyes, which insure a constant level of illumination of proper density.

Gates concealed in the ceiling can be pulled down the full corridor width to cut off any separate unit, such as auditorium, gymnasium, cafeteria, or library, for night use. Window guards can be swung free. Machine guards are painted a bright color so that the instructor at a glance can tell when they are not in position. Shops, domestic science, and science laboratories are so located that fire in one will not cut off the exit. Entrances to the cafeteria are equipped with gang hand-washing trays to encourage sanitation. Toilets are equipped with vacuum breakers to avoid any possibility of water contamination. All air taken into the building is filtered. Individual exhausts are provided for toilets, laboratories, cafeterias and shops.

Safety features in the cafeteria include a non-skid terrazzo floor, gang wash fountains at entrance, kitchen separated entirely by fire-walls; all kitchen equipment supplied with safety devices. Note the concealed lighting in the beams

MECHANICAL AND ELECTRICAL ENGINEERING CONSULTANTS

The following directory is restricted to Mechanical and Electrical Engineering Consultants who are in independent professional practice and have actually been identified with a number of university or school projects.

Space limitations permit only three listings for each individual or firm and preclude mentioning the name of the architect associated. The following abbreviations are used throughout: h (heating), v (ventilating), p (plumbing), ac (air conditioning), e (electrical), l (lighting), m (mechanical), pp (power plant).

CALIFORNIA

E. L. Ellingwood, 124 W. 4th St., Los Angeles
University of Arizona, Tucson (*h, v, ac, e, m, sewage disposal, water systems*)
University of Southern California, Los Angeles (*h, v, ac, e, m, sewage disposal, water systems*)
University of Redlands, Redlands (*h, v, ac, e, m, sewage disposal, water systems*)

Robt. M. Storms, 816 W. Fifth St., Los Angeles
Pepperdine College Auditorium, Los Angeles (*h, v, p*)
Union Elementary School Addition, Bishop (*h, p*)
Visalia Junior College, Visalia (*h, v, p, ac*)

Clyde E. Bentley, 216 Pine St., San Francisco
Woodland High School Shop Unit, Woodland (*h, p, e*)
Madera High School Science Building, Madera (*h, v, p*)
Alexander Hamilton Junior High School, Fresno (*h, v, p*)

Hunter & Hudson, 41 Sutter St., San Francisco
Hoover War Library, Stanford University (*h, v, ac, p, e*)
Social Sciences and Life Sciences Groups, University of California at Los Angeles (*h, v, ac, p, e*)
University of Nevada, Reno (*three buildings and power plant*)

Leland & Haley, 58 Sutter St., San Francisco
San Francisco Junior College, San Francisco (*h, p*)
George Washington High School, San Francisco (*h, p*)
El Cerrito High School, Richmond (*h, v*)

G. M. Simonson, 625 Market St., San Francisco
Berkeley High School Science and Commerce Building, Berkeley (*h, v, p, e*)
University of California Library and Administration Building, Davis (*h, v, p, e*)
San Francisco Junior College Science and Gymnasium Buildings, San Francisco (*e*)

CONNECTICUT

Paul D. Bemis, 36 Pearl St., Hartford
Domonic Burns School, Hartford (*h, p, v, e*)
Norwich Free Academy, Norwich (*h, v, e*)
West Middle School, Hartford (*h, p, v, e*)

Paul D. Harrigan, 37 Whitney Ave., New Haven
Mt. Carmel School, Hamden (*p, h, v*)
Rocky Hill School, Rocky Hill (*p, h, v*)
Helen St. School, Hamden (*p, h, v*)

Hubbard, Rickerd & Blakeley, 275 Orange St., New Haven (also at Boston, Mass.)
Library, Connecticut College for Women, New London (*m*)
High School, Brattleboro, Vt. (*h, e, p*)
Westwood High School, Westwood, Mass. (*m*)

DELAWARE

Robert P. Schoenijahn, Industrial Trust Bldg., Wilmington
University of Delaware, Newark (*h, v, p, e, ac, new boiler installation*)
H. Fletcher Brown Vocational High School, Wilmington (*p, h, v, e*)
Elkton High School, Elkton, Md. (*p, h, v, e*)

DISTRICT OF COLUMBIA

M. F. Hoppe, 1621 Connecticut Ave., Washington, D. C.
East Bethesda Elementary School, East Bethesda, Md. (*h, v, e*)
Our Lady of the Lourdes School and Convent, Bethesda, Md. (*h, v, e*)
Sidwells Friends School, Washington, D. C. (*h, alterations to various buildings*)

Wm. K. Karsunky, 1223 Connecticut Ave., Washington, D. C.
Catholic University of America, Dormitory and Administration Bldg., Washington, D. C. (*m, e*)
St. Ann School, Washington, D. C. (*m, e*)
Landon School for Boys, Bethesda, Md. (*m, e*)

Thomas H. Urdahl, 726 Jackson Place, N. W., Washington, D. C.
Bancroft School Addition, Washington, D. C. (*h, p, e*)
Benjamin Franklin High School, Norwalk, Conn. (*h*)
National Education Association, Washington, D. C. (*h, p, v, e, elevators*)

Weschler & Cleary, 732 17th St., N. W., Washington, D. C.
Trinity College Science Bldg., Washington, D. C. (*h, v, p, e*)
Kingsman School, Washington, D. C. (*h, v, p, e*)
Officers School, U. S. Marine Corps, Quantico, Va. (*h, v, p, e*)

FLORIDA

John C. Pastor, 1091 Talbot Ave., Jacksonville
Seabreeze High School, Board of Education, Volusia City, Daytona Beach (*m, p, h, v*)
San Jose High School, Board of Education, Duval City, Jacksonville (*m, p, h, v*)

ILLINOIS

Irving E. Brooke, 189 W. Madison St., Chicago
Elgin Academy, Elgin (*h, p, v, wiring, refrig.*)
Central School, Harvard (*h, v, wiring*)
St. Procopius College Chemistry Bldg., Lisle (*h, p, v, wiring*)

Joseph L. Fatz, 5914 W. North Ave., Chicago
Washburne Trade School, Chicago (*h, v, p, power, dust collection*)
South Side Trade School, Chicago (*dust collection*)
Wilson Junior College, Chicago (*h, v, p, power, acoustics*)

Robert E. Hattis, 332 S. LaSalle St., Chicago
Scott Hall, Northwestern University, Evanston (*h, v, ac, e, refrig.*)
North Park College Science Bldg. (*h, v*)
Park Ridge Grade School, Park Ridge (*h, v*)

John Howatt, Board of Education, 228 N. LaSalle St., Chicago
Lane Technical High School (*h, v, p*)
South Side Vocational High School (*h, v, p*)
Oakenwald Elementary School (*h, v, p*)

George W. Hubbard, Railway Exchange Bldg., Chicago
Elementary School, Flossmoor (*h, p*)
St. Leo's High School Addition, Chicago (*h, p*)
Visitation High School Addition, Chicago (*h, p, v*)

A. C. King, 35 S. Dearborn St., Chicago
Lake Forest College, Lake Forest (*h*)

Samuel R. Lewis, 407 S. Dearborn St., Chicago
Toledo Public Schools, Toledo, Ohio (*h, v*)
Gregory Hall and Illinois Union, Urbana (*h, cooling, p, e*)
High School, Woodstock (*m*)

Neiler, Rich & Co., 431 S. Dearborn St., Chicago
Abbott Hall, Northwestern University Dormitory, Chicago (*h, v, e, refrig., elevators*)
Willard Hall, Northwestern University Dormitory, Evanston (*h, v, e, refrig., elevator, drinking water system, hot water piping*)
University of Chicago Public Administration Bldg., Chicago (*h, v, p, e, ac, elevators, drinking water system*)

Beling Engineering Company, Moline
University of Illinois Additions, Urbana (*p, h, ac*)
Augustana College Library, Rock Island (*h*)
St. Ambrose College, Davenport, Iowa, Library and Administration Building (*h, v*)

S. Alan Baird, Commercial National Bank Bldg., Peoria
Niles Township Community High School, Niles Center (*h, v, p, e*)
Addition to Washington School, Bloomington (*h, v, p, e*)
School, Nokomis (*h, v, p, e*)

INDIANA

Charles R. Ammerman, Century Building, Indianapolis
Four Dormitory Buildings, Indiana University, Bloomington (*h, v, p, e*)
College of Religion, Butler University, Indianapolis (*h, v, p, e*)
Public School No. 86, Indianapolis (*h, v, p, e*)

Bevington-Williams, Inc., K. of P. Bldg., Indianapolis
Arts Building, Ball State Teachers College, Muncie (*h, v, p, e*)
Hall of Music, Indiana University, Bloomington (*h, v, ac, p, e*)
John H. Harrison Hall, DePauw University, Greencastle (*h, v, ac, p, e*)

J. M. Rotz Engineering Co., Merchants Bank Bldg., Indianapolis
Arsenal Technical High School, Indianapolis (*m*)
Irvington High School, Indianapolis (*m*)
South Side High School, Ft. Wayne (*m*)

G. M. Williams, 333 N. Pennsylvania St., Indianapolis
Medical Building, Indiana University, Bloomington (*h, v, p, e*)
Physical Science Building, Indiana University, Bloomington (*h, v, p, e*)
Hall of Music, Indiana University, Bloomington (*h, v, p, e*)

IOWA

Everett M. Bartek, Independent School District, 629 Third St., Des Moines
East High School, Des Moines (*boiler and stoker installation*)
Elmwood School, Des Moines (*h*)
Ft. Des Moines School, Des Moines (*h, v, sewage disposal*)

B. E. Landes, Hubbell Building, Des Moines
Women's Gymnasium, Iowa State College, Ames (*h, v, p, e*)
Agassiz and North Court Grade Schools, Ottumwa (*h, v, p, e*)
Grade School, Storm Lake (*h, v, p, e*)

M. L. Todd, 1111 Independence Ave., Waterloo
New Hampton High School, New Hampton (*h, v*)
Frances Grout School, Waterloo (*h, v*)
High-School Gymnasium-Auditorium Addition, Hubbard (*h, v, p, power*)

MASSACHUSETTS

Alfred Kellogg, Belmont
Fitchburg High School, Fitchburg (*h, v, p, e*)
Dartmouth College, Hanover, N. H.

G. K. Saurwein, 247 Slade St., Belmont
Harvard Medical School Power Plant, Boston (*entire project*)
Harvard University, Cambridge (*fire protection, h, v, ac, e, steam distribution underground systems*)
New England Conservatory of Music, Boston (*automatic h control, pp problems*)

Hollis French, Office of, 210 South St., Boston
Yale University—Whitney Gymnasium, Sterling Library, numerous Dormitories and other buildings, New Haven, Conn. (*h, v, ac, p, fire protection, e, pp*)
Gloucester High School, Gloucester (*h, v, p, e, boiler plant and fire protection*)
Andover School Group, Andover (*h, v, e, boiler plant*)

Hubbard, Rickerd & Blakeley, 110 State St., Boston (also at New Haven, Conn.)
Westwood High School, Westwood (*h, v, p, e*)
High St. School, Medway (*h, v, p, e*)
School, Medway (*h, v, p, e*)

William A. McPherson, Department of School Buildings, 26 Norman St., Boston
Agassiz School (*h, v*)
Addition to Practical Arts High School (*h, v*)
Addition to W. H. Taft School (*h, v*)

MICHIGAN

J. N. Hadjisky, 744 Bates St., Birmingham
Michigan Normal College, Girls' Dormitory, Ypsilanti (*h, v, p*)
Barnum School, Birmingham (*swimming pool operation*)

Farrell & White, 409 Griswold St., Detroit
Redford High School, Detroit (*p, h, v, e*)
Anthony Wayne Elementary School, Detroit (*p, h, e*)
Addition to Wayne University, Detroit (*p, h, e*)

N. B. Hubbard, 243 W. Congress St., Detroit
Stockwell Hall, University of Michigan Dormitory, Ann Arbor (*h, p, v*)
Men's Dormitory, University of Michigan, Ann Arbor (*h, p, v*)
Addition to Columbus School, Detroit (*h, p, v*)

Snyder & McLean, Penobscot Building, Detroit
Gymnasium and Field House, Michigan State College, East Lansing (*h, v, p, e, public address*)
Men's Dormitory, Michigan College of Mines, Houghton (*h, v, p, e, m*)
Women's Dormitory, Western State Teachers College, Kalamazoo (*h, v, p, e, m*)

Ray S. M. Wilde, 194 Connecticut St., Highland Park
Cranbrook School for Boys, Bloomfield Hills (*m, e*)
Kingswood School for Girls, Bloomfield Hills (*m, e*)
Michigan Union Dormitory, Ann Arbor (*m, e*)

MINNESOTA

Charles Foster, Medical Arts Building, Duluth
Eveleth High School Assembly Alterations, Eveleth (*h, p, e*)
Soudan School Gymnasium, Soudan (*v*)
Sandstone High School, Sandstone (*two new boilers*)

Ralph L. Bloom, Sexton Bldg., Minneapolis
Auditorium and Classroom Addition, Osakis
School Addition, Waite Park
School Addition, Grey Eagle

A. D. Martino, Metropolitan Life Bldg., Minneapolis
Paynesville School Addition, Paynesville (*p, h, v, e*)
St. Mark's School, Shakopee (*p, h, e*)

G. M. Orr & Company, Baker Arcade Bldg., Minneapolis
State Teachers College, Physical Education Building, Mankato
Central School, Rochester
Mound School, Mound

Rose & Harris, Essex Bldg., Minneapolis
High School, Montevideo (*m*)
Miller Vocational School, Minneapolis (*m*)
Library, St. Olaf College, Northfield (*m*)

A. L. Sanford, Empire Bank Building, St. Paul
Wallace Hall Dormitory, Macalester College, St. Paul (*h, v, p, e*)
High School, Bloomington (*h, v, p, e, t.c., boiler plant*)
Public Schools, Minneapolis (*h, v, p, e, t.c., elevators, pp*)

MISSOURI

William L. Cassell, 912 Baltimore Ave., Kansas City
Sumner High School, Kansas City (*h, v, p, wiring*)
University of Nebraska, Field House and Student Activity Building, Lincoln (*h, v, p, wiring*)
University of Kansas City, Gymnasium and Science Building, Kansas City (*h, v, p, wiring*)

Walter E. Gillham, 1207 Grand Ave., Kansas City
Buildings for the University of Arkansas, Fayetteville (*h, v, p, e*)
Public Schools, St. Joseph (*h, v, p, e*)
University of Nebraska Dormitory, Lincoln (*m*)

John D. Falvey, 316 N. 8th St., St. Louis
Culver Military Academy, Culver, Ind. (*pp, m*)
High School, Wellston (*h, v, p, e*)
Lanphier High School, Springfield, Ill. (*h, v, e, p*)

A. H. Vogel, 6134 Tennessee Ave., St. Louis
Men's Dormitory, Women's Dormitory, Biochemistry Building, Green House, University of Missouri, Columbia (*h, v, underground piping, etc.*)
Two Dormitories and Student Activities Building, Stephens College, Columbia (*h, v, hot water generators,* etc.)
Women's Dormitory, Lincoln University, Jefferson City (*h, v*)

NEBRASKA

H. S. Seymour, World-Herald Bldg., Omaha
Junior and Senior High School, Lead, S. Dak. (*h, v, p, e*)
Women's Residence Hall, University of Wyoming, Laramie, Wyo. (*h, v, p, e*)
Converse Grade School, Cheyenne, Wyo. (*h, v, p, e*)

NEW YORK

George A. Teeling, 1 Columbia Place, Albany
Cayuga Union School, Cayuga (*sewage disposal system*)
Pine Grove School, Rotterdam (*h, v*)
St. Patrick's School, Troy (*h*)

Thomas F. Dwyer, Board of Education, 49 Flatbush Ave. Ext., Brooklyn, N. Y.
Ft. Hamilton High School (*h, v, ac*)
Forest Hills High School (*h, v, ac*)
Midwood High School (*h, v, ac*)

Beman & Candee, 374 Delaware Ave., Buffalo
Kenmore Senior High School, Kenmore (*h, v, p, e*)
Cassadaga Central School, near Sinclairville (*p, h, v, e*)
Clark Memorial Gymnasium, University of Buffalo (*h, v, p, e, steam tunnel*)

Edward E. Ashley, 10 E. 40th St., New York
Library Extension, Sterling Hall of Medicine, Yale University, New Haven, Conn. (*p*)

Victor J. Cucci, 30 Church St., New York
Chapel, Skidmore College, Saratoga Springs (*h, v*)
Laboratory, St. Lawrence University, Canton (*p, sanitation*)
Science Building, Hampton Institute, Hampton, Va. (*h, v*)

Albert Fentzlaff, Inc., 11 W. 42nd St., New York
High School, Wappingers Falls (*p, h, v*)
High School, Bayshore (*p, h, v*)
High School, Glen Cove (*p, h, v*)

Jaros, Baum & Bolles, 415 Lexington Ave., New York
Monroe Hall, Middlebury College, Middlebury, Vt. (*h, v, p*)
Gifford Hall, Middlebury College, Middlebury, Vt. (*h, v, p*)
Medical School, Syracuse University, Syracuse (*h, v*)

Krey and Hunt, 292 Madison Ave., New York
Brentwood School, Brentwood (*p, e, h, v*)
Mt. Vernon Seminary, Washington, D. C. (*p, h*)
Classroom Building, Clark College, Atlanta, Ga. (*e*)

William McClintock, 647 E. 232nd St., New York
Bronx High School of Science, New York (*h, v, p*)
Morris High School, New York (*h, v, p*)
Manual Training High School, Brooklyn (*h, v, p*)

Alfred J. Offner, 139 East 53rd St., New York
Hotchkiss School, Lakeville, Conn. (*h, v*)
Lawrenceville School, Lawrenceville, Conn. (*h, v*)
New Canaan Country School, New Canaan, Conn. (*h, v*)

Clyde R. Place, 420 Lexington Ave., New York
Yale College, New Haven, Conn. (*p*)
Aquinas School, New York, N. Y. (*p, h, e*)
Public Schools, New York, N. Y. (*p, h, e*)

Slocum & Fuller, 18 E. 41st St., New York
Public Schools, Norwalk, Conn. (*h, p, e*)
Cranford High School, Cranford, N. J. (*h, p, e*)
South Scranton High School, Scranton, Pa. (*h, p, e*)

Frank Sutton, 149 Broadway, New York
Gymnasium, Rutgers University, New Brunswick, N. J. (*h, v, e*)
Schermerhorn and Physics Building, John Jay Hall, Columbia University, New York (*h, v*)
Law School Group, University of Michigan, Ann Arbor (*h, v, e*)

Syska & Hennessy, 420 Lexington Ave., New York
Long Beach Junior-Senior High School, Long Beach (*h, v, p, e*)
University of North Carolina Chemistry Building, Chapel Hill (*h, v, p, e, elevators*)
Hillside High School, Hillside N. J. (*h, v, p, e*)

Paul Wunderlich, Grand Central Terminal Bldg., New York
Student Alumnae Building, Wheaton College, Norton, Mass. (*h, p, e*)
Recreation and Science Buildings, Choate School, Wallingford, Conn. (*h, v, p, e*)
Science Building, Butler Hall and Gerard Hall, Marymount College, Tarrytown (*h, v, p, e*)

Stanley C. Stacy, Board of Education, 13 South Fitzhugh St., Rochester
John Marshall High School (*h, v, p, e*)
No. 4 School (*h, v, p, e*)
Junior Vocational School (*h, v, p, e*)

Harold L. Alt, 115-27 225th St., St. Albans
North Side High School, Newark, N. J. (*h, ac, v*)
Shanghai American School, Shanghai, China (*h, p, boiler plant*)
Schenley High School, Pittsburgh, Penna. (*h, v, boiler plant*)

Acheson & Acheson, Eckel Building, Syracuse
High School, Ilion (*h, v*)
University Block, Syracuse University, Syracuse (*elevators, e*)
Bus Garage, Board of Education, Marcellus (*h, e*)

Irwin W. Whittemore, Cannon Place, Troy
Slingerlands Grade School, Delmar (*entire project*)
Thomas A. Knickerbocker Junior High School, Lansingburgh, Troy (*entire project*)

OHIO

William E. Bodenstein, Second National Bank Bldg., Cincinnati
Public Schools, Cincinnati (*h, v, e*)
High School, Middletown (*h, v*)
Kaiser Junior High School, Dayton (*h, v*)

Fosdick & Hilmer, Union Trust Bldg., Cincinnati
Miami University, Oxford (*h, v, p, e, pp, refrig.*)
University of Cincinnati, Cincinnati (*pp, etc.*)
Holmes High School, Covington, Ky. (*h, v, p, e, temperature reg., boilers, stokers*)

A. M. Kinney, Inc., Enquirer Bldg., Cincinnati
Denison University, Granville (*pp, h, p, e*)
Lincoln Grant School, Covington, Ky (*m*)
Mount Washington School, Cincinnati (*m*)

O. W. Motz, 920 E. McMillan St., Cincinnati
Student Union, University of Cincinnati (*h, v, temp. control, e*)
Addition to Chemistry Building, University of Cincinnati (*h, v, temp. control, e*)
Junior and Senior High School, Mariemont (*h, v, temp. control, e, p*)

John Paul Jones, Cary & Millar, Terminal Tower, Cleveland
Girls Gymnasium, Oberlin College, Oberlin (*h, v, p, e*)
Hall Auditorium, Oberlin College, Oberlin (*h, v, p, e*)
Additions to Rayen and Scienceville High Schools, Youngstown (*h, v, p, e*)

Willard C. Pistler, Leverone Bldg., Cincinnati
Branch Hill School, Branch Hill (*h, v, p, e*)
Sixth District School, Covington, Ky. (*h, p, e, v*)
Boone County School, Burlington, Ky (*h*)

OREGON

J. Donald Krocker, Failing Bldg., Portland
Science Building, Williamette University, Salem (*h, v, p, pp*)
Hospital, University of Oregon Medical School (*h, v*)
Library, University of Oregon Medical School (*h, v*)

Thomas E. Taylor, Postal Bldg., Portland
Memorial Union Building, Oregon State College, Corvallis (*ac*)
Addition to Library Building, Oregon State College, Corvallis (*h, v*)
Sunset School, West Linn (*h, v*)

PENNSYLVANIA

Harry B. Joyce, Commerce Building, Erie
State Teachers College, Clarion (*tunnels, steam mains, pp*)
State Teachers College Auditorium Building, Edinboro (*h, v, e*)
State Teachers College, Slippery Rock (*pp*)

Chas. A. Blatchley, Drexel Bldg., Philadelphia
Two Schools, York (*h*)
Junior High School, Upper Darby Township, Delaware Co. (*m, e*)
North-West Junior High School, Reading (*m, e*)

Harry J. Eggly, Jr., Architects Bldg., Philadelphia
Senior High School, Norristown (*h, v*)
Bala Cynwyd Junior High School, Lower Merion Township (*h, v*)
Liberal Arts and Library Buildings, Franklin & Marshall College, Lancaster (*p, h, ac, pp*)

Louis T. Klauder and Associates, Lincoln Liberty Bldg., Philadelphia
Frick Chemical Laboratory, Princeton University, Princeton, N. J. (*h, v, p, e*)
Markle Hall of Mining, Lafayette College, Easton (*h, v, p, e*)
Power House, Stone Hall, Botany Laboratories, Wellesley College, Wellesley, Mass. (*m, e*)

Charles S. Leopold, 213 S. Broad St., Philadelphia
Temple University, Unit No. 2 (*h, v*)
Grade School, Reading (*p, h, v, e*)
Joint University Library, Vanderbilt University, Nashville, Tenn. (*ac, p*)

Moody & Hutchison, Architects Bldg., Philadelphia
Chemistry and Geology Building, Bryn Mawr College, Bryn Mawr (*h, v, p, e*)
Wyomissing High School, Wyomissing (*h, v, p, e*)
Academic Building, U. S. Military Academy, West Point, N. Y. (*h, v, p, e*)

Pennell and Wiltberger, Broad and Chestnut Sts., Philadelphia
Northeast Catholic High School for Girls, Philadelphia (*h, p, e*)
Bell Avenue School, Yeadon (*p*)
Bloomsburg State Teachers College, Bloomsburg (*m, including pp*)

George W. Powell, Jr., 112 S. 16th St., Philadelphia
Garretford Public School, Upper Darby Township, Delaware Co. (*p, h, v, e*)
Green Tree Public School, Willistown Township, Chester Co. (*p, h, v, e*)
St. Marks Parochial School, Bristol (*h*)

Julian S. Simsohn, 933 N. Broad Street, Philadelphia
Abington School Gymnasium, Abington Township (*steam supply*)
Glensides Weldon School, Abington Township (*entire project*)
Cheltenham School Gymnasium, Cheltenham (*entire project*)

Elwood S. Tower, Investment Bldg., Pittsburgh
Taylor County Schools, Grafton, W. Va. (*h, v, p, e*)
Cabell County Schools, Huntington, W. Va. (*h, v*)
Duquesne University Library Building, Pittsburgh (*h, p, e*)

RHODE ISLAND

John J. McCarthy, Providence Public School Department, 20 Summer St., Providence
Hope High School (*h, v*)
Mount Pleasant High School (*h, v*)
Nathanael Greene Junior High School (*h, v*)

SOUTH CAROLINA

Lockwood Greene Engineers, Inc., Montgomery Bldg., Spartanburg (also at 10 Rockefeller Plaza Center, New York, N. Y., and 40 Central St., Boston, Mass.)
The Citadel, Charleston (*entire project*)
Southside Junior High School, Spartanburg (*entire project*)
Cleveland Junior High School, Spartanburg (*entire project*)

TEXAS

Kribs & Landauer, Dallas Gas Bldg., Dallas
Alterations to Lamar Elementary School and Physical Education Building, Palestine (*p, h, e*)
University Park School Addition, Highland Park Independent School District, Dallas (*p, h, e*)
Margaret B. Henderson Ward School, Dallas (*p, h, v, e*)

R. K. Werner, W. T. Waggoner Bldg., Fort Worth
Physical Education Bldg., Texas State College for Women, Denton (*p, h, e*)
High School, Acadia Parish School Board, Crowley, La. (*p, h, e*)
Journalism Bldg., Texas State College for Women, Denton (*p, h, e*)

Dale S. Cooper, 216 E. Cowan St., Houston
St. Agnes School for Girls, Houston (*m, e, h, v*)
High School, Luling (*h, v*)

R. F. Taylor, Bankers Mortgage Bldg., Houston
Laundry and Help's Dormitory, A. & M. College of Texas, College Station (*p, h, e*)
Six Dormitories, A. & M. College of Texas, College Station (*p, h, e*)
Winnfield Elementary School, Winnfield (*h*)

VIRGINIA

Wiley & Wilson, Peoples Bank Bldg., Lynchburg
High School, Charlottesville (*h, v*)
Colored Elementary School, Lynchburg (*h, v*)
Gymnasium, University of North Carolina, Chapel Hill (*h, v*)

WASHINGTON

Lincoln Bouillon, 1411 Fourth Ave. Building, Seattle
J. M. Perry Institute of Trades, Industries, Agriculture, Yakima (*m, e*)
The Dalles High School, The Dalles (*h, v, p, e*)
Campus Elementary School, Western Washington College of Education, Bellingham (*h, v, p, e*)

DeWitt C. Griffin, Lloyd Bldg., Seattle
School, Bellevue (*h, v, p, e*)

C. W. May, Smith Tower, Seattle
Wallace School, Kelso (*h, v, p, e, ac*)
College of Puget Sound Women's Dormitory, Tacoma (*h, v, p, e, ac*)
Chemistry and Science Building, Washington State College, Pullman (*h, v, p, e, ac*)

Erwin L. Weber, Medical Arts Bldg., Seattle
High School Auditorium Gymnasium, Everett (*h, ac, p, e*)
Addition to High School, Clover Park (*h, ac, p, e*)
Schools, Wenatchee (*h, ac, p, e*)

C. G. Zokelt, 3810 24th Ave. South, Seattle
Anchorage Grade School and High School Additions, Anchorage, Alaska (*h, v, p, e*)
Longview Grade and High School Additions, Longview (*h, v, p*)
Mount Vernon Grade School, Mount Vernon (*h, v*)

Smith Engineering Company, 308 N. Delaware Ave., Wenatchee
School Addition, Connell (*entire project*)
Swimming Pool, Connell School District, Connell (*entire project*)

WISCONSIN

G. L. Larson, 1213 Sweetbriar Road, Madison
Biochemistry Building, University of Wisconsin, Madison (*h, v, ac*)
Adams, Roosevelt and Washington Schools, Janesville (*h, v*)
Lapham and Marquette Schools, Madison (*h, v*)

CANADA

Walter J. Armstrong, 1010 St. Catherine St., W., Montreal, P. Q.
St. Hilda's College, Toronto University, Toronto, Ont. (*h, v, p, e*)
Stanstead College, Stanstead, P. Q. (*h, v, p, e*)
High School, Lachine, P. Q. (*h, v, p, c*)

TILE-TEX MEETS THE REQUIREMENTS OF EVERY SCHOOL AREA!

1. ENTRANCE LOBBIES—Striking design possibilities, long-wearing, and non-slip.
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3. CLASSROOMS—Long-wearing, non-distracting to the pupil, easy to keep clean, and suitable for either fixed or movable seating equipment.
4. TOILETS and RESTROOMS—Acid resistant, sanitary, permanent, and easy to clean.
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6. LABORATORIES—Acid and alkali resistant, comfortable to stand and walk on, and easy to clean.
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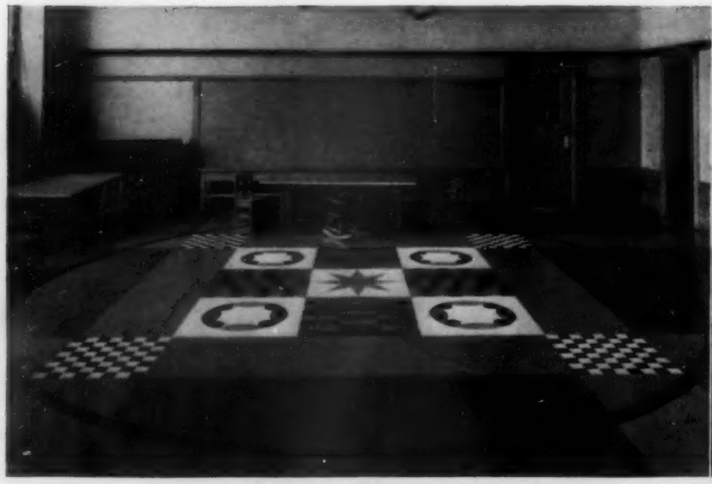
9. CAFETERIAS and LUNCHROOMS—Easy and inexpensive to maintain, good-looking, long-wearing, and, where necessary, available in Greaseproof colors.
10. OFFICES—Good appearance, durable, quiet, and easy to keep clean.

Tile-Tex is available in four distinct color lines—Economy, Standard, DeLuxe, and Greaseproof—all of the same high quality. The judicious selection of colors to meet the specific requirements of each school area is possible because of these carefully designed color groups. Fifteen sizes and three thicknesses give added flexibility to both design and construction problems.

Laboratory—Cornell Medical College
New York, N. Y.

Office—Southampton Grade School
Southampton, N. Y.



Kindergarten—Monroe School
Monroe, Connecticut

Library—Southampton Grade School
Southampton, N. Y.

Lobby—Riverhead High School
Riverhead, N. Y.

Corridor—St. Mary College & Academy
Monroe, Michigan

Classroom—Riverhead High School
Riverhead, N. Y.

Cafeteria—Harvard University
Cambridge, Massachusetts

PARTIAL LIST OF TILE-TEX SCHOOL INSTALLATIONS

Southampton Grade School, Southampton, Long Island (35,000 ft.)
Wm. LaFon, Architect, Southampton, Long Island
Las Vegas High School, Las Vegas, Nevada (38,000 ft.)
Geo. A. Ferris & Son, Architects, Reno, Nevada
St. Mary College and Academy, Monroe, Michigan (300,000 ft.)
D. A. Bohlen & Son, Architects, Indianapolis, Indiana
Northwestern University, Evanston, Illinois (40,000 ft.)
Belchertown State School, Belchertown, Massachusetts (6,200 ft.)
Kendall, Taylor & Company, Architects, Boston, Massachusetts
University of Mississippi, Oxford, Mississippi
Frank P. Gates Co., Architects, Jackson, Mississippi
Cornell Medical College, New York, N. Y. (110,000 ft.)
Coolidge, Shepley, Bulfinch & Abbott, Architects, Boston, Massachusetts
Berry Schools, Rome, Georgia (30,000 ft.)
University of Wisconsin, Madison, Wisconsin
Arthur Peabody, Architect, Madison, Wisconsin
Clifford B. Connelly School, Pittsburgh, Pennsylvania (50,000 ft.)
Edward B. Lee, Architect, Pittsburgh, Pennsylvania
Louisiana State University, New Orleans, Louisiana (43,000 ft.)
Weiss, Dreyfous & Seiferth, Architects, New Orleans, Louisiana
Riverhead High School, Riverhead, Long Island (52,000 ft.)
Wm. LaFon, Architect, Southampton, Long Island
Terrell School, Fort Worth, Texas (22,000 ft.)
Phillips Exeter Academy, Exeter, New Hampshire (20,500 ft.)
Cram & Ferguson, Architects, Boston, Massachusetts
Junior High School, Sidney, Ohio (13,090 sq. ft.)
Loudenbach, Greytag & Loudenbach, Architects, Sidney, Ohio
Matteson High School, Matteson, Illinois (3,000 ft.)
Wainwright & Vaughn, Architects, Hammond, Indiana
Washington State Normal School, Ellensburg, Washington
J. W. Maloney, Architect, Yakima, Washington
New York University, New York, N. Y.
Augustus N. Allen, Architect, New York, N. Y.
Junior High School, Benton Harbor, Michigan (15,200 ft.)
Warren Holmes Company, Architects, Lansing, Michigan
Grade School, Old Lyme, Connecticut (15,000 ft.)
Ernest Sibley, Architect, Litchfield, Connecticut
University of Idaho, Southern Branch, Pocatello, Idaho (20,500 ft.)
Wyandotte County High School, Bethel, Kansas (11,800 ft.)
Peterson & Almon, Architects, Kansas City, Missouri
University of Alabama, Union Building, Tuscaloosa, Alabama (35,000 ft.)
Miller & Martin, Architects, Birmingham, Alabama
Washington Irving School, New York, N. Y. (32,000 ft.)
Board of Education Architect
University of Florida, Gainesville, Florida
Rudolph Weaver, Architect, Gainesville, Florida
Swanton School, Swanton, Ohio
Langdon, Hohly & Gram, Architects, Toledo, Ohio
Ethel Walker School for Girls, Simsbury, Connecticut (45,000 ft.)
St. Vincent DePaul School, Mt. Vernon, Ohio (14,800 ft.)
Glass & Ramsey, Architects, Columbus, Ohio
Calvin College, Grand Rapids, Michigan (10,800 ft.)
Robinson & Campeau, Architects, Grand Rapids, Michigan
Georgetown University Dormitory, Georgetown, D. C. (61,600 ft.)
Emil G. Perrot, Architect, Philadelphia, Pennsylvania
Concordia College, St. Paul, Minnesota (9,850 ft.)
Long & Thorshov, Architects, Minneapolis, Minnesota
Kent State Normal School, Kent, Ohio (15,700 ft.)
T. Ralph Ridley, State Architect, Columbus, Ohio
Morton Grade School, Hastings, Nebraska (29,200 ft.)
M. L. Evans, Architect, Hastings, Nebraska
Harrison Avenue Grade School, Mamaroneck, N. Y. (22,500 ft.)
District School No. 69, Watseka, Illinois (3,000 ft.)
North Junior High School, Joplin, Missouri (12,400 ft.)
T. W. Williamson, Architect, Topeka, Kansas
Brookville School, Brookville, Indiana (12,400 ft.)
Henkel & Hansen, Architects, Connersville, Indiana
University of Tennessee, Memphis, Tennessee
Jones & Furbringer, Architects, Memphis, Tennessee
Bell Skinner Musical Building, Vassar College, Poughkeepsie, N. Y. (3,000 ft.)
Allen, Collens & Willis, Architects, Boston, Massachusetts
Danvers High School, Danvers, Massachusetts (23,500 ft.)
Chas. G. Loring, Architect, Boston, Massachusetts

TILE-TEX WALL TILE—A NEW, LOW-COST WALL TILING—IDEAL FOR CORRIDOR WAINSCOTING

COLORS

A wide range of color, from light pastel shades to rich dark hues, is available.

Practically any decorative scheme is possible. Send for "Decorative Walls by Tile-Tex" which includes complete color charts.

An attractive corridor wainscot of Tile-Tex Wall Tiling

SIZES

Fourteen sizes, from small to large, make possible wall treatments heretofore not attainable with other wall materials.

Sizes are 3x3, 3x6, 4x4, 4½x4½, 4x12, 6x6, 6x12, 6x18, 9x9, 9x18, 9x27, 12x12, 12x24, and 18x24.

●

Now it is possible for schools to wainscot their corridors with an economical, durable, and attractive tiling which can be applied over existing plaster walls in present buildings, or over smooth plaster backing in new construction.

Toilets, restrooms, and cafeterias are other areas where this new, unique wall surfacing can be used to advantage. It's easily and quickly erected—it can be had in almost any color scheme in both plain and mottled colors—and it's simple and inexpensive to clean.

The cost of Tile-Tex wall tiling applied is considerably less than conventional ceramic tile. If alteration or damage necessitates repairs, it is possible to do so quickly and inexpensively with Tile-Tex wall tiling without muss or fuss. Installation is made by skilled wall covering contractors located throughout the principal cities and towns of the country.

THE TILE-TEX COMPANY
CHICAGO HEIGHTS, ILL.

THE GOODYEAR TIRE & RUBBER COMPANY, INC.

Akron, Ohio · · Los Angeles, Calif.

Wingfoot Rubber Flooring is suitable for all types of installations

WINGFOOT RUBBER FLOORING

HANDSOME and fresh-looking because of its bright colors and the ease with which it is cleaned.

HARMONIZES with all kinds of decorative schemes because of the wide variety of design and color combinations available.

DURABLE despite heavy traffic and hard usage . . . seldom, if ever, has to be replaced.

QUIET and comfortable underfoot because of its smooth, resilient surface.

ADAPTABLE to old and new buildings . . . ideal for classrooms and laboratories since it is not marred by inks or even most acids, alcohol, smoke or cigarette burns.

TWO FORMS AVAILABLE

WINGFOOT SHEET RUBBER FLOORING—comes in continuous rolls and costs less, making it more suitable for large floor areas.

WINGFOOT RUBBER TILE FLOORING—comes in individual blocks of specified size, shape, thickness and colors . . . differs from the sheet flooring in form alone.

WINGFOOT WALL RUBBER

Wingfoot Wall Rubber has all the advantages of beauty, durability and cleanliness found in Wingfoot Rubber Flooring.

Wingfoot—T.M. The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER
GOODYEAR

CONGOLEUM-NAIRN INC.

General Office: Kearny, New Jersey

Nairn Linoleum . . Ideal from Kindergarten to Post Graduate School for Floors and Walls

The pictures on these two pages illustrate the many uses of linoleum floors and walls in modern school construction. A striking example of the desirability of Nairn Linoleum. The Board of Education of Red Hook, N. Y., demanded the most up-to-the-minute building possible with the funds at hand for the new Red Hook Central School. The result is a school that is attracting unusually favorable comment from architects everywhere. The finest and most modern equipment of the building trade industry was incorporated throughout the construction and appointment of the school. It was natural, therefore, that Nairn Linoleum was selected for service over practically every square foot of the interior.

Nairn Linoleum, with its perfectly smooth, sanitary surface, has long been recognized as the ideal school floor. It is quiet and resilient underfoot, and easy to keep spotlessly clean. Moreover, it is inexpensively installed and lasts for years under the most punishing foot-traffic, without costly refinishing.

For school **walls,** Nairn Wall Linoleum provides an attractive, washable, **permanent** finish that is fade-proof, crack-proof and water-proof.

An attractive, appropriate Nairn Veltone floor in the kindergarten of the Red Hook Central School. Note the use of Nairn Wall Linoleum to wainscot height, with one-piece cove base and border

Nairn Linoleum gives this staircase beauty and safety. Veltone, with Nairn Wall Linoleum on walls and rounded over stair bannisters

Medical offices in Red Hook Central School. Nairn Linoleum with one-piece cove base eliminates hiding places for dirt or germs

For durability on floors, safety on stairs, utility on walls, and for beauty and cleanliness throughout, this installation of Nairn Linoleum products in the Red Hook Central School presents a self-evident and long-lasting testimonial to the diversity and value of linoleum for schools.

The range of design and color combinations in Nairn Linoleum for interior decoration are virtually unlimited and adaptable to almost every area in school construction.

Nairn Linoleum Floors and Walls are superior to other types of interior covering because they are more durable, easier to keep clean, germ-killing, insulating, beautiful in their own right, and—**not more expensive.** Nairn Linoleum makes any school a more pleasant, more inspiring place in which to work and learn.

For catalogs, samples, and free assistance in your wall or floor problems, write our Contract Department at Kearny, N. J.

Unique and practical use of Nairn Wall Linoleum in a window seat in the Red Hook kindergarten

NAIRN
Reg. U. S. Pat. Off.
Linoleum Floors and Walls
CONGOLEUM-NAIRN INC.

The *perfect* corridor floor—Nairn Veltone Linoleum, which muffles the sound of clattering footsteps, yet will stand up under the most punishing heavy-duty service

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KEARNY, NEW JERSEY

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Quality Rubber Tile Flooring

FOR NEARLY A QUARTER OF A CENTURY, Wright Rubber Flooring has been used with success in many of the finest schools and universities throughout the country. Offered by a company that not only pioneered, but specializes exclusively in the manufacture of rubber tile, Wright Flooring is a stand-out in its field for beauty, durability, and easy maintenance.

MEETS ALL SCHOOL REQUIREMENTS

Wright Flooring is available in the form of WRIGHTFLOR or WRIGHTEX. Both tiles are of high quality construction and fulfill all school flooring requirements. WRIGHTFLOR is a hard-surface composition tile with rubber content. Its hard surface makes it particularly adaptable to heavy traffic areas where ease of maintenance is essential. WRIGHTEX is a soft surface tile with a greater degree of resilience—especially suited to areas where quiet is an important factor and ease of maintenance is less a problem.

EASY TO MAINTAIN

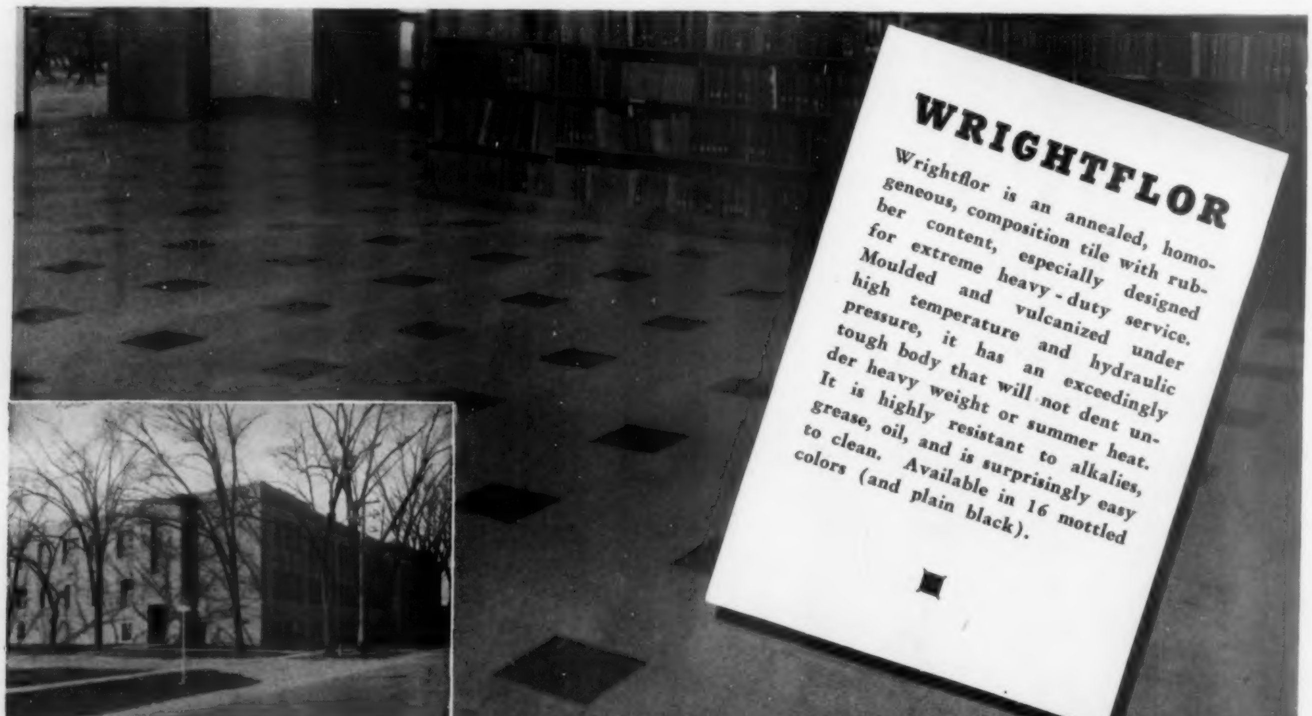
All Wright floors have a smooth, tough, surface that stands up under the most severe traffic abuse. It maintains its original beauty even after many years of hard usage. It's non-absorbing, non-conducting, and fire-resisting. Because of its high resistance to dirt and stains, it is remarkably easy to keep clean.

MANY ATTRACTIVE COLOR COMBINATIONS

Wright Rubber Tile has long been recognized for its rare beauty of color and designs. Offered in a wide variety of plain and mottled color combinations, it lends itself perfectly to any decorative scheme.

EASILY INSTALLED

You will find Wright Rubber Tile adaptable to practically all floor areas—classrooms, libraries, assembly rooms, laboratories, corridors, etc. Conforming to all sub-floor conditions it is easily installed on new or old floors. It stays permanently flat and will not warp, curl, or crack to cause undue expense for replacement or repairs.



Wrightflor Installation in Brodhead High School, Brodhead, Wisconsin. Architect, Stark and Schneider, Madison, Wis.

Wrightex Installation in new University of Wisconsin Memorial Union addition. Architect, Corbett & MacMurray, New York, N. Y.

LOOK AT THESE REPRESENTATIVE WRIGHT INSTALLATIONS

WRIGHTFLOR

Edgerton High School, Edgerton, Wis.
Northwestern University, Chicago, Ill.
Chemistry Bldg., University of Wisconsin, Madison
Theodore Roosevelt High School, Bronx, N. Y.
Sigma Alpha Mu House, Champaign, Ill.
Edgewood Academy, Madison, Wis.
Watertown High School, Watertown, Wis.
Elkhorn High School, Elkhorn, Wis.
Greenwood School, Waukegan, Ill.
Valparaiso University, Valparaiso, Ind.
Cafeteria, Montgomery Ward & Co., Chicago, Ill.
Sears, Roebuck & Company, State Street Store, Chicago
Sears, Roebuck & Company, North Avenue Store, Milwaukee
Sears, Roebuck & Company, Phoenix, Arizona
Sears, Roebuck & Company, Rochester, N. Y.
U. S. Hospital, Chanute Field, Rantoul, Ill.
State Office Building, Madison
Bob Jones College, Cleveland, Tenn.
Sears, Roebuck & Company, Minneapolis, Minn.
Ansul Chemical Company, Marinette, Wis.

WRIGHTEX

Washington Jr. High School, Green Bay, Wis.
Grafton High School, Grafton, W. Va.
Women's Dormitory Bldg., Univ. of Wis., Madison
Cancer Bldg., University of Wisconsin, Madison
Junior & Senior High School, Harrison, N. Y.
Natural Resource Bldg., Univ. of Illinois, Urbana
Library Building, Southeastern Louisiana College, Hammond
Business Administration Bldg., Indiana University, Bloomington, Ind.
Auditorium & Fine Arts Bldg., Louisiana Polytechnic Institute, Ruston, La.
Auditorium & Fine Arts Bldg., State Normal College, Natchitoches, La.
South Side Vocational School, Chicago, Ill.
University of Louisville, Louisville, Ky.
Clinic & Infirmary Bldg., State University, University, La.
Bowling Green State University, Bowling Green, Ohio
State Normal School, Brookport, N. Y.
Tau Delta Phi Fraternity, Champaign, Ill.
Vocational School, La Crosse, Wis.
Library Bldg., Colorado State College, Greeley, Colo.
Chamberlin School, Goshen, Ind.
LaCrosse Junior High School, La Crosse, Wis.
Hillview School, LaCrosse, Wis.
Equitable Life Building, Chicago, Ill.
Hyde Park Breweries, Inc., St. Louis, Mo.
Republic County Court House, Belleville, Kansas
Cushing Library, Cushing, Okla.
Public Library, Mason City, Iowa

See **SWEETS ARCHITECTURAL CATALOG**
FOR COMPLETE SPECIFICATIONS

WRIGHT RUBBER TILE

THOS. MOULDING FLOOR MFG. CO.

EXECUTIVE OFFICES

165 West Wacker Drive, Chicago, Ill.

DISTRICT SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

FLOOR WITH RESILIENT THOS. MOULDING *Moultile* FOR ENDURING BEAUTY

Flexible-Reinforced

MASTER ASPHALT TILE

Durability, the most important requirement for school floors, is an outstanding characteristic of Moultile Asphalt Tile. Millions of scuffing, scraping feet will cause no perceptible wear . . . will not affect color and texture which are uniform throughout. Moultile, therefore, requires no expensive periodic refinishing.

Moultile is quiet underfoot and has a pleasant resilience and elasticity. Available in more than 60 plain and marbleized colors and twelve sizes, Moultile can be installed in a practically unlimited variety of patterns. Colors are clear and do not fade.

Suitable for All Areas—Moultile is ideal for classrooms, corridors, and lobbies. In gymnasiums it yields a secure footing which does not tire contestants or cause floor burns and may quickly be waxed for dancing. There are special types of Thos. Moulding Tile . . . "Greaseproof" Tile for school kitchens, cafeterias, domestic science rooms, etc., and "Acid-resistant" Tile for laboratories, toilets, etc.

Applicable to All Types of Sub-floor—Moultile may be applied over any smooth and firm sub-floor. Where subfloors are uneven or springy, Thos. Moulding has developed special materials for smoothing and strengthening preparatory to installing the finished Moultile floor. (See "Plastic Floors" below.)

Ideal for Basement Floors—Moultile and the asphalt cement in which it is laid are impervious to the alkali and dampness always present in cement resting on the ground, which destroy other types of flooring. Moultile bonds permanently, does not buckle or loosen and will not rot or decompose. It solves the problem of flooring over cement resting on the ground.

Installation—Thos. Moulding and other approved flooring contractors contract to install floors anywhere in the United States and nearby countries. Write for samples and complete technical information on Moultile and the company's other products, listed below.

THOS. MOULDING PRODUCTS

Tile Floors and Walls

- Moultile Master Asphalt Tile
- Moultile Prewaxed
- Greaseproof Tile
- Acid-Resistant Tile
- Cove Base. On-top Base
- Straight Base
- Moultile Wall Tile
- Safety Tile

Plastic Floors

- Asphalcrete (for smoothing rough cement)
- Underlayment (for smoothing and reinforcing wood subfloors)
- TMB Master Mastic Flooring
- Moulstone Magnesia Composition Flooring

Maintenance Materials

- Permagloss Self-polishing Wax—Sweepolene Sweeping Compound—Kleenolene Non-caustic Soap

ABOVE—Catskill School, Catskill, N. Y.—35,000 ft. Moultile—Ernest Sibley, Architect

LEFT—Harrison Hall, DePauw University—25,000 ft. of Thos. Moulding Acid-Resistant Tile and Asphalcrete—DePauw University Engineering Dept., Architects

BELOW — Attractive Moultile Design in the Library of the Antigo, Wis., High School—Max Hanisch, Architect

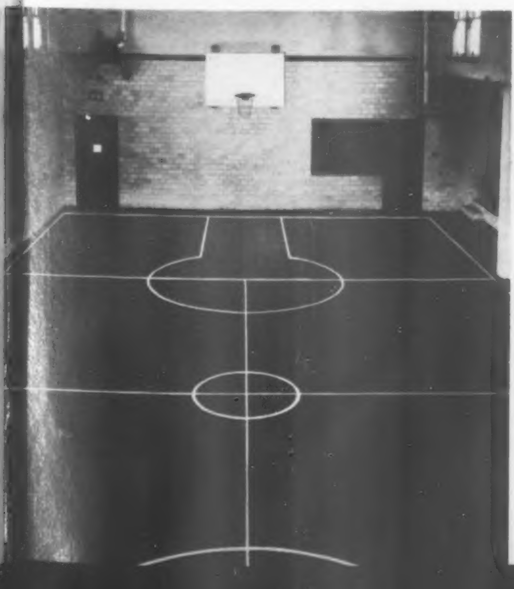
Monroe School, Davenport, Iowa
30,000 ft. Moultile and Thos. Moulding Flexible Base
Child & Smith, Architects; Kruse & Parish, Asso. Architects

ARMSTRONG'S

FLOORS · WALLS · ACOUSTICAL MATERIALS
FOR THE MODERN SCHOOL

Above. This Piedmont Beach, California, kindergarten shows how original floor designs can be carried out with Armstrong's Linoleum. Field is No. 025 Marbelle with insets of plain colors. Seats and table tops are also linoleum-covered. Armstrong's Linoleum comes in a whole rainbow of attractive colors that can be cut to whatever shape you wish.

Below. This gym, in the Evendale School, Sharonville, Ohio, *like many others*, has a durable, practical floor (with inset court lines) of Armstrong's Asphalt Tile—permanently resistant to moisture and alkalis present in concrete subfloors on or below grade.



WHY YOU GAIN BY ORDERING ALL THESE MATERIALS FROM ONE DEPENDABLE MANUFACTURER

WHEN you build or remodel, you will find that it pays to order your floorings, wall finishes, and acoustical ceilings from one dependable manufacturer. For example, Armstrong makes the only complete line of resilient floorings—rubber tile, linoleum, asphalt tile, and many others. Therefore, we do not have to "push" any one type and can frankly recommend the kind best suited to your needs. At the same time, we can give you helpful suggestions on wall finishes and acoustical materials. This not only will save your time, but it will mean that *all* these products are backed by the reputation of a firm which, for 40 years, has been making top-quality building materials.

Pages 82 and 83 of this folder describe our floorings. Page 84 describes our wall finishes and acoustical materials. Further information will be furnished upon request. Your architect or builder will find these products described in *Sweet's Architectural Catalog File.*

ARMSTRONG'S COMPLETE LINE

RUBBER TILE · LINOTILE (OIL-BONDED)

FLOORING

Below are described the Armstrong floorings most generally used in schools. In varying degrees, all are quiet, restful, durable, and economical to maintain. All are installed by cementing and may be used over wood, metal, tile, marble, concrete, or terrazzo subfloors. Asphalt tile, however, is the only type recommended for use on concrete subfloors which are in direct contact with the ground, either on or below grade.

RUBBER TILE

Armstrong-Stedman Reinforced Rubber Tile has a high gloss finish that is easy to maintain. Exceptionally quiet and restful, it is made with an invisible fibre reinforcement in the rubber that makes it highly resistant to wear. Cigarette burns are easily removed with steel wool. Sixty colors in plain, marble, paisley, two-tone, and Granitone effects. Three thicknesses: 1/8", 3/16", and 1/4". A wide variety of sizes and shapes is available.

LINOLEUM

Armstrong's Linoleum is accepted as the standard of quality in hundreds of schools. More than 200 colors and patterns are available. Each of these colorings runs right through the material to the sturdy burlap backing. Hence, constant scuffing of feet, sliding desks and chairs cannot mar or dim its beauty. *Seven types:* Battleship, Plain, Jaspé, Marbelle, Monobelle, Embossed Inlaid, and Straight Line Inlaid. Five gauges: 6 mm., 3/16", 1/8" (Heavy), Medium, and Standard.

Over wood floors, specify that linoleum be pasted over lining felt. This adds exceptional comfort and years of wear to linoleum floors. Floor linoleum is not recommended as a wall covering. A lighter linoleum-like material (*Linowall*, page 84) should be used instead.

Above. Note how colorful this long-lasting Armstrong's Asphalt Tile floor makes the auditorium of the Chaffey Junior College, Ontario, California. The colors here are tan marble, old rose marble, travertine, Pompeian red, and black.

Below. Youngsters play safely on this sanitary floor of Armstrong's Asphalt Tile in the kindergarten of the Nathan C. Schaeffer School, Manheim Township, Pennsylvania. This asphalt tile won't harbor germs, dust, or dirt.

OF RESILIENT FLOORINGS

LINOLEUM • ASPHALT TILE • CORK TILE

Above. Floors like this one—of Armstrong-Stedman Reinforced Rubber Tile—quiet footsteps in a library most effectively and give long-lasting service. This is the law library of University of Santa Clara, Santa Clara, Cal.

Below. Note the quiet harmony of this floor of Armstrong's Cork Tile in the Scribbs College for Women, Claremont, California. A striking combination of the various shades of cork tile is used here to achieve this pleasant design.

LINOTILE (Oil-Bonded)

LINOTILE is even more resistant to indentation than battleship linoleum of the same thickness. It resembles—but should not be confused with—linoleum cut into blocks. Available only from Armstrong, it is an ideal flooring for halls and other heavy-traffic areas.

Twelve plain and marble colors in many sizes, all in 1/8" thickness are available.

ASPHALT TILE
Standard, Greaseproof, and Industrial

THREE types of asphalt tile are available: (1) *Standard*, in decorative colors, for use in any area where it is not exposed to greases, oils, or strong alkalis; (2) *Greaseproof*, for kitchens or other areas exposed to grease and alkalis; (3) *Industrial*, a low-cost material for shops and workrooms where traffic is heavy and dark colors are not objectionable. Non-slip if left unwaxed—hence suitable for ramps.

Asphalt tile costs less than other types of resilient flooring. Although it is harder than the other types, it is the only kind recommended for gymnasiums, basements, or other subfloors in direct contact with the ground, either on or below grade.

Standard Asphalt Tile is made in forty-one plain and marble colorings and in various sizes. Thicknesses: 1/8" and 3/16".

Greaseproof Asphalt Tile is made in a variety of plain and marble colorings and in several sizes. Thicknesses: 1/8" and 3/16".

Industrial Asphalt Tile is made in seven plain and marble colors and in several sizes. Thicknesses: 1/8", 3/16", 1/4", and 3/8".

CORK TILE

FOR areas where utmost quiet is desired and where the flooring will not be exposed to grit or extremely severe traffic, cork tile is suitable. This dignified, restful material is often used in libraries, chapels, and private offices. It is available in several sizes, with square or beveled edges. Colors: light, medium, and dark brown. Thicknesses available are 1/2" and 5/16".

LINOWALL

LINOWALL, a linoleum-like wall covering, never needs refinishing. It costs only about half as much as other permanent materials.

Finger marks and ordinary stains can be removed with mild soapsuds. It resists chipping and denting and can be streamlined over rounded corners. It may also be used on ceilings.

Linowall can be applied to new or old plaster in good condition and to plasterboard. The material is waterproof and the seams can be waterproofed. Thus it may be used in bathrooms, laundries, and kitchens. It should not be installed in enclosed shower stalls.

Sizes: 3′ and 6′ widths. Thirty-one colors.

CORKOUSTIC

THE problems of *quieting noise* in corridors, lunch rooms, gymnasiums, and other school areas, and of *correcting acoustics* in auditoriums and music rooms, are both solved easily and economically by ceilings of Corkoustic.

This beautifully-textured cork material absorbs unwanted sound and eliminates excess reverberation and echo. It can be washed or vacuum-cleaned, or even repainted when necessary without affecting its acoustical efficiency. A choice of pastel colorings—all excellent reflectors of light—assure harmony with decoration plans. Corkoustic also insulates effectively.

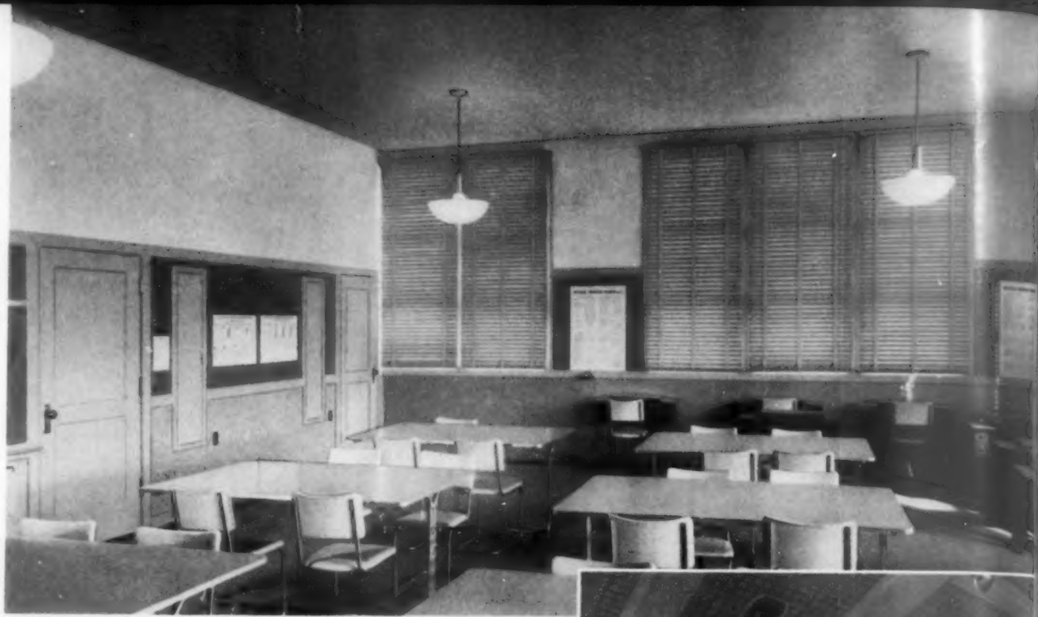
A variety of thicknesses is available, and a range of tile-form unit sizes, which permit ceilings to be installed in many attractive designs.

TEMCOUSTIC

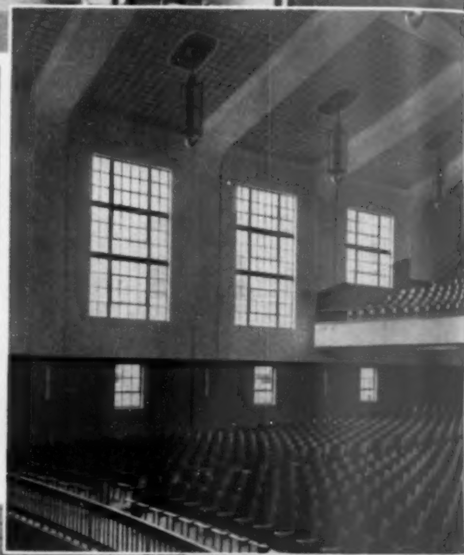
AN effective degree of noise-quieting or acoustical correction, at low cost, may be obtained with ceilings of Armstrong's Temcoustic—a fibrous material in tile form. A choice of popular colors, sizes, and thicknesses is available.

WRITE FOR INFORMATION

For complete information and samples of Armstrong's Linoleum, Resilient Tiles, Linowall, and Acoustical Materials, write to Armstrong Cork Company, 1240 State Street, Lancaster, Pa.



Above. "A penny for a spool of thread, a penny for a needle"—but not a cent for wall refinishing in this sewing room of the Washington Grammar School, Bakersfield, California. Why? Because the walls are covered with washable, linoleum-like Linowall.



Right. Acoustically perfect is this auditorium in the University City (Missouri) High School auditorium, thanks to its ceiling of Armstrong's Corkoustic. This attractively textured cork material eliminates unwanted reverberation and "echo."

Below. Let youngsters yell to their hearts' content. A ceiling of Corkoustic (as in this gymnasium of Wappingers Falls, N. Y., District School) absorbs noise as effectively as a sponge absorbs water.

ARMSTRONG CORK COMPANY
LANCASTER · · · PENNSYLVANIA

PRINTED IN UNITED STATES OF AMERICA

SERVICISED PRODUCTS CORPORATION

Manufacturers and Distributors

MAIN FACTORY—Chicago **6051 West 65th St., Chicago, Ill.** BRANCHES IN PRINCIPAL CITIES

WHEN you are considering materials for school construction, remember that Servicised Quality products are giving exceptional service in this field. Continuous development of better products has won for **"Servicised"** leadership in the application of plastic, elastic and waterproofing materials to better building.

SERVICISED PRODUCTS FOR SCHOOLS

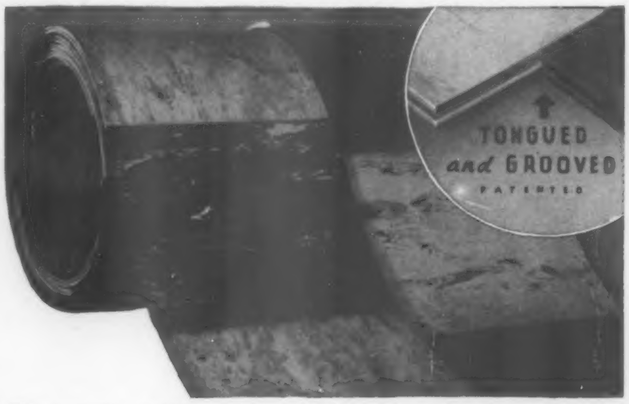
Asphalt Expansion Joints	Rubberlok Interlocking Rubber Flooring
Cork Expansion Joints	Cork-Rubber Tile
Cork-Rubber Expansion Joints	Rubber Tile Flagging
Sponge-Rubber Expansion Joints	Safety Stair Treads
Asphalt Plank Flooring—Plain, Rock-Surfaced and Armored	Waterproofing Materials
Asphalt Roof Decking	Asphalt Floor Tile

RUBBERLOK RUBBER FLOORING

RUBBERLOK Rubber Flooring is making architectural history. It has revolutionized all previous standards of laying and maintaining rubber floors. Rubberlok gives color and comfort and cuts cost of installation.

It makes a beautiful, resilient floor which cannot warp, curl, creep nor crack—and can be easily laid by any handy man at one-quarter the cost of installing single tile.

Rubberlok Rubber Flooring is made in 10 ft. strips which can be laid to make an impervious floor



The accurate tongue-and-groove joint shown in upper right corner ensures a perfect-fitting floor covering

The unique feature of Rubberlok is that it comes in 10-foot slabs, tongued and grooved on sides and ends for tight and interlocked matching. The pattern blocks are held together by a flexible stock which acts as an expansion joint between blocks. It cannot be laid wrong since it fits together so easily and accurately. Rubberlok is not merely a floor covering but a floor in itself.

A variety of non-fading colors and a wide range of patterns, both mottled and solid, are available. Slabs are furnished in 6", 9", and 12" widths, 10 feet long and 3/16" or 1/4" thick.

Rubberlok is recommended as economical and pleasing for any public room. We shall be glad to send you a special detailed folder and color chart on Rubberlok, the rubber flooring innovation.

RUBBER FLAGSTONE TILE

Brilliant in appearance, pleasing in design and color combinations, Servicised Rubber and Cork Rubber Flagstone Tile is rapidly coming into vogue for service floors which must be durable as well as attractive.

This flagging is usually laid in lobbies, reception rooms and entrance halls but it is equally adaptable to any floor space in the building. It has a distinctive and "livable" personality all its own and, in addition, provides a durable, easily-cleaned floor which is restful under-foot.

Rubber Flagstone Tile

SERVICISED RUBBER SAFETY TREAD

This is a recently developed Servicised product, far in advance of similar treads available at retail stores. It is a carefully moulded and cured product, made of finest pure para rubber. Easily installed, these treads give long and reliable service without cracking or peeling, and with high resistance to abrasion, oil, acids and moisture.

A real quality rubber stair tread that will stand the "gaff"

CORK-RUBBER TILE

Over a period of three years, Servicised engineers have checked up on Servicised Cork-Rubber Tile, both in actual service and in the laboratories. Their findings are conclusive: this new Servicised product meets all requirements for an ideal, silencing, resilient flooring material.

Cork-Rubber Type Flagstone Tile

Its advantages: (1) High dirt resistance; (2) Flexible, conforming to minor variations of base without breakage; (3) Resists indentations and scratches; (4) Impervious to air, water and acids; (5) Light, yet very strong; (6) Lasting Beauty.

Servicised Cork-Rubber Tile is a great improvement over cork flooring with a resin binder. It will give better service and deserves consideration for vestibules, corridors, gymnasium floors, libraries, infirmaries, etc.

Detailed Bulletins on these specialized flooring products will be furnished promptly at your request.

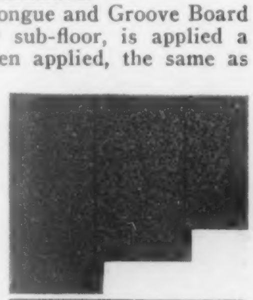
Use SERVICISED materials for tile installation work. SERVICISED underlayment to cover wood floors unsuited to saturated felt. SERVICISED asphalt primer or binder for smoothing uneven and rough concrete.

CORK RUBBER TONGUE AND GROOVE BOARD

Cork Rubber Tongue and Groove Board is a flooring board compounded of live rubber and ground cork. It is layed over inexpensive wood sub-floor, and produces an attractive, resilient, non-slippery, noiseless and easy tread flooring, assisting greatly in acoustical efficiency.

In color it has a slight random effect and can be had in dark or natural colors with standard thickness of 3/4" x 3 1/8" width; greater widths can also be furnished.

The installation of Cork Rubber Tongue and Groove Board is very simple. Over the ordinary sub-floor, is applied a 15-lb. felt paper. The Board is then applied, the same as Tongue and Grooved Lumber, plus a cement made for this purpose.



If a board flooring effect is desired, silence, soft tread under foot, semi-acoustical treatment, consider Rubber Cork Board as an outstanding item. The toughness and long life are also outstanding features. The artistic beauty and its soft natural and dark shade, blend in with any desired decorative color scheme.

SEE OUR PAGE ON EXPANSION JOINTS, 00225

THE JENNISON-WRIGHT CORPORATION

Toledo, Ohio

BRANCHES IN ALL LARGE CITIES

Kreolite Separate Wood Block Floors serve in the school and educational institution no less than in the factory and work shop where today their use is so general as to reveal Kreolite as the national choice for heavy-duty service.

Especially is Kreolite specified for all departments where mechanical operations are carried on. Tools are not damaged when they are dropped, for the Kreolite floor is resilient. The floor is not damaged because wear and accident leave no appreciable impression upon the tough end grain surface of the specially treated selected wood blocks.

Among the scores of leading educational institutions now enjoying the economy and benefit of Kreolite Wood Block Floors are: East Tech. High School, Cleveland, Ohio; Jefferson High School, Los Angeles, Calif.; Lindbloom High School, Chicago, Ill.; University of Michigan, Ann Arbor, Mich.; Purdue University, Lafayette, Ind.; Technical High School, Indianapolis, Ind.; University of Illinois, Urbana, Ill.; University of Wisconsin, Madison, Wisc.; Yale University, New Haven, Conn.

Write for complete information

KREOLITE

WOOD BLOCK FLOORING

Kreolite Wood Block Floors Used in Over 200 Schools!

Kreolite Flexible Strip End Grain Wood Block Floor in the Gymnasium of the New York State Vocational Institution, West Coxsackie, New York

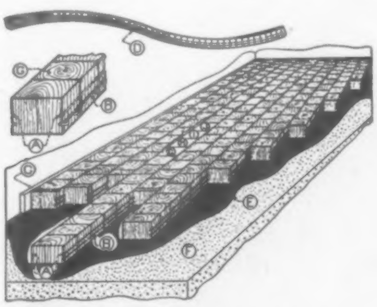
One of the many Kreolite gymnasium floors giving maximum of resilience, safety, appearance, wear, non-slipping, and all around satisfaction as to its ability to successfully withstand gymnasium play of all kinds.

The value of Kreolite Flexible Strip End Grain Wood Block Flooring is recognized instantly by the modern architect of schools and public buildings. They cannot become loose in the floor. The durability is practically limitless as the strips are laid with the tough end-grain of the individual blocks uppermost. The light natural color and beauty of the wood are retained, although the blocks are treated with a transparent, waterproof preservative.

Complete Information Sent on Request

(a)—Metal wire truss binding the individual blocks into a compact, solid monolithic-like end-grain plank or strip.

(b)—Metal spline binding the individual strips together.



(c)—Cork expansion joint laid flush with the surface of the floor.

(d)—Flexibility—can be laid over wood sub-floor, in mill type buildings.

(e)—Waterproof membrane between concrete and strips.

(f)—Smooth finish concrete foundation.

(g)—Surface sanded smooth.

(h)—Manufactured from properly dried yellow pine or fir.

(i)—Treated with a transparent, odorless, waterproofing preservative so that the natural light color of the wood is maintained. The surface of the floor may be waxed and highly polished if desired, presenting a most pleasing and beautiful design.

(j)—Laid with the tough end-grain up. End-grain blocks run full depth of strips, from top to bottom, each block being anchored to the base, in a bed of mastic.

Kreolite Wood Block Floors Used in Over 200 Schools!

AMERICAN MASON SAFETY TREAD CO.

GENERAL OFFICE AND FACTORY

Lowell, Mass.

Description: A metal plate of Iron, Bronze or Aluminum impregnated with abrasive grains or flint-like particles projecting above the surface, presents a Non-Slip stair tread both durable and safe under all conditions.

Application: Stair treads and platforms for new or old construction, ramps, door and elevator saddles, floor plates, trench covers, and spiral stair treads.

Assistance: Solution of stair and slipping hazard problems gladly suggested.

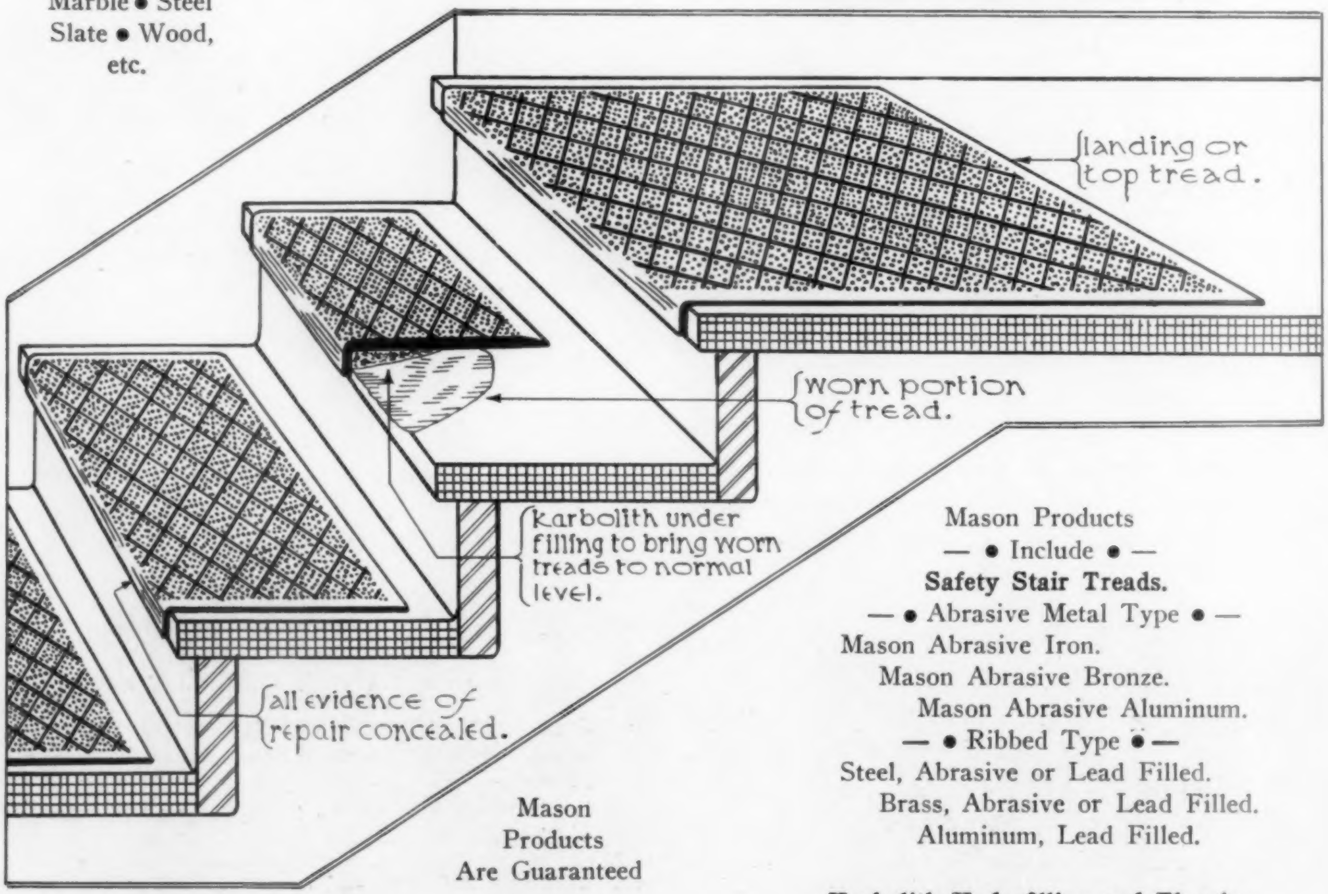
Advantages: Painful accidents on new or worn stairs can be prevented economically by application of Mason Abrasive Iron or Mason Ribbed Type Safety Treads.

Mason Safety Treads are used by Educational and Religious Institutions, in Public Terminals, and Industrial Plants, etc.

Mason Safety Treads are recommended by leading Architects, Safety Engineers and Insurance Companies.

Suitable for
Marble • Steel
Slate • Wood,
etc.

Recommended Method of Applying Mason Abrasive Metal to Worn Stair Treads



Mason
Products
Are Guaranteed

Mason Products
— • Include • —
Safety Stair Treads.
— • Abrasive Metal Type • —
Mason Abrasive Iron.
Mason Abrasive Bronze.
Mason Abrasive Aluminum.
— • Ribbed Type • —
Steel, Abrasive or Lead Filled.
Brass, Abrasive or Lead Filled.
Aluminum, Lead Filled.

Karbolith Underfilling and Flooring.
Mason Stair Nosings and Edgings.
Mason Safety Ladder Shoes.
Mason Extruded Thresholds.

CELEBRATING
OVER 50 YEARS OF SERVICE
TO MANKIND
PREVENTING STAIR ACCIDENTS
Catalogue and Samples
Supplied without obligation

. . . AGENTS IN PRINCIPAL CITIES . . .

THE SAFE TREAD COMPANY

Manufacturers of

The Improved Abrasive Impregnated Iron, Bronze and Aluminum Safety Tread

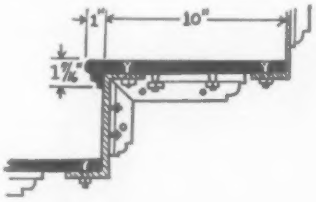
— "SAFE TREAD" —

30 Vesey St., New York City

AGENTS IN PRINCIPAL CITIES

The Vitrified Ceramic Abrasive Anti-Slip Tile, and Aggregate for Terrazzo, in 16 Colors

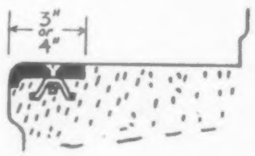
The necessity of providing slip-proof walkways for the safety of children and teachers has been established by the courts.



STYLE N5 — FOR NEW CONSTRUCTION

Maintenance costs are likewise of utmost importance.

The use of "Safe Tread" Stairtreads—Door Sills, Platforms, Landings, etc., for new construction or repairs to existing walkways will insure the highest degree of **Nonslip** qualities and the greatest amount of **wearability.**

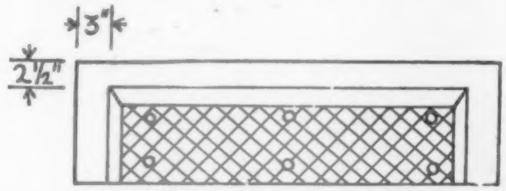


STYLE XL NOSINGS — FOR NEW CONCRETE

When Ordering or Requesting Quotation

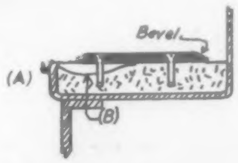
Specify iron, bronze or aluminum Safe Tread—style nosing desired, width **overall** or **back of nosing** width, length, surface design (see below), quantity of each size. If unusual shapes are required, furnish detail sketch or template. If for repairs, advise what type material is being covered and sizes wanted.

Submit your walkway problems to us; we shall be glad to help you solve them.

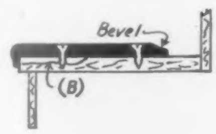


STYLE L — LIP ALONG FRONT EDGE, BEVELED BACKS AND ENDS

Recommended practice for repairs carry new tread to within 2½" of back edge of existing step and to within 3" of side of existing step.



Concrete or Pan Filled

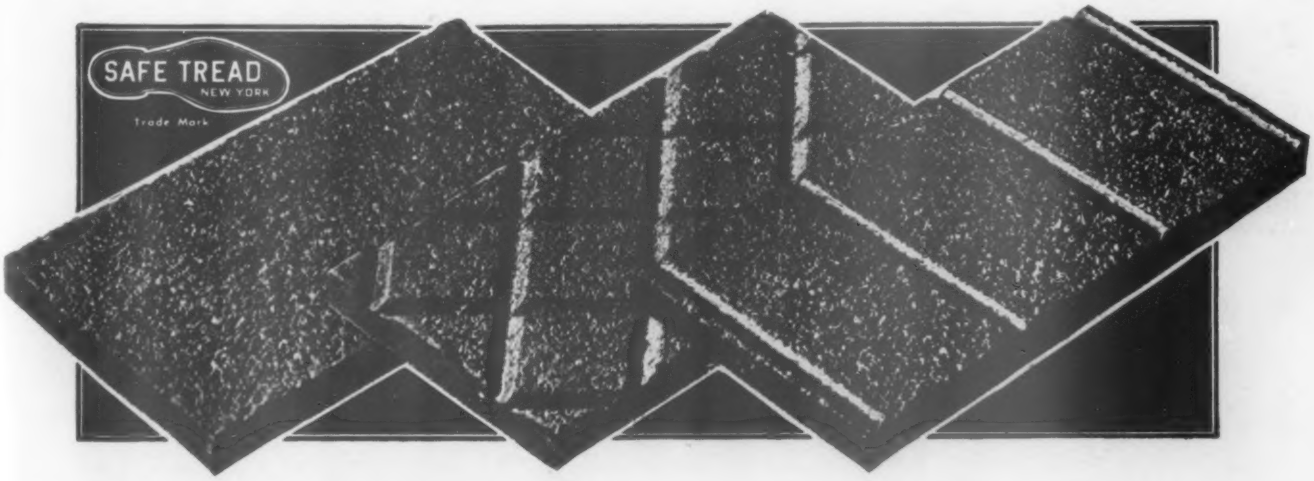


Wood, Marble or Stone

STYLE L — FOR REPAIRS

(A) ⅛", ½", ¾", 1" or 1½", whichever required to cover worn area.

(B) Fill worn spots (B) with cement before putting new treads in place.



JOHNS-MANVILLE

22 East 40th Street, New York, N. Y.

OFFICES IN ALL LARGE CITIES

J-M SOUND CONTROL FOR SCHOOLS AND UNIVERSITIES

SHUFFLING feet, ringing bells, shouts and outside noises cause a virtual bedlam of noise in many schools and universities. As a result, teachers are under a constant nervous strain, students are inattentive and cannot concentrate. In many schools, students are actually 40% deaf simply because of the noise surrounding them and the poor acoustics of most classrooms and auditoriums. This is one of the most serious problems confronting educational authorities today.

Yet, there is one sure way to solve the problem once and for all. Johns-Manville, pioneer in the field of sound control, offers materials and methods to banish this nerve-wracking evil quickly and economically. Even the noisiest room can be quieted and made a pleasant, efficient place in which to teach and study. J-M Sound Control Materials reduce unwanted sound to harmlessness and at the same time bring desirable sound—in the form of lectures and public addresses—directly to the ears of students without distortion or interference.

J-M OFFERS A COMPLETE SERVICE

A complete line of J-M Sound Control Materials is available to meet every school and university requirement.

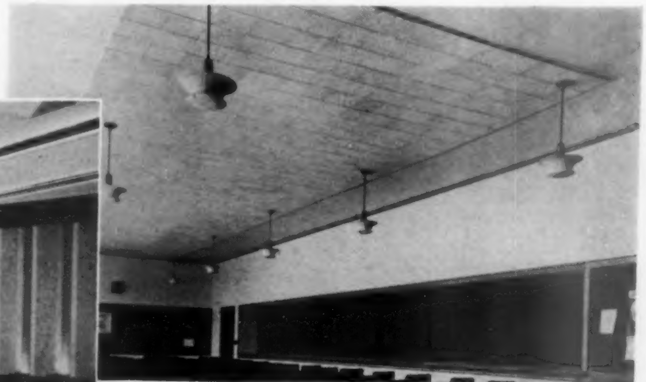
Sanacoustic, for example, has been widely used wherever noise conditions are particularly severe. Consisting of a perforated metal facing backed with a rock wool sound-absorbing pad, this material is so designed that it absorbs 85% of all noise that strikes it.

Permacoustic, a ceramic acoustical tile, is recommended for use where maximum beauty and dignity is desired. Its interesting stone-like texture harmonizes perfectly with almost any decorative scheme.

Transite Acoustical Units are designed for use in swimming pools, kitchens, gymnasiums, locker rooms and other locations where excessive moisture or severe physical abuse may be encountered. For preventing noises generated in wood-working shops, machine shops, ventilating equipment and similar noise areas from reaching classrooms and study halls, Johns-Manville has developed an ingenious system of sound isolation that confines these sounds and vibration to their source.

ASK FOR FULL DETAILS

You will be interested in the Johns-Manville brochure, AC-26A. It describes the characteristics and uses of all J-M Sound Control Materials, and tells how you may obtain the services of Johns-Manville Acoustical Engineers without obligation on your part. The booklet is free on request at any Johns-Manville office.



(Above) New Classroom in Evansville (Wis.) School. Here a J-M Sound Control Treatment soaks up unnecessary noise, makes teaching and studying easier

(Left) Hall of Music, Purdue University. Sound Control Materials on ceilings and walls of this beautiful auditorium assure perfect hearing conditions

J-M ASPHALT TILE FLOORING

Johns-Manville Type A Asphalt Tile Flooring, composed of rectangular units of various sizes and colors, provides a resilient, quiet, decorative and long wearing floor that is ideal for use in the modern school or university. With the great variety of plain and marbleized colors and innumerable patterns possible, any desired effect is easily obtained—bright and cheerful, dark and rich, gay or unobtrusive—harmonizing perfectly with the decorative scheme of any school or university location.

Quiet and Sanitary

The unusual resiliency of J-M Asphalt Tile Flooring cushions footsteps and promotes quiet foot traffic. Furthermore, it is odorless, non-absorbent and will not originate dust. This, with its ease of cleaning, makes it particularly adapted to the high sanitary standards that must be maintained in all school and university locations.

Fire-resistant, Easily Maintained

J-M Asphalt Tile Flooring is fire-retardant and has been officially approved for use in fireproof buildings in many large cities throughout the country. Furthermore, the toughness and durability of the material is such that, barring exceptional abuse, it requires no attention or expense for maintenance beyond ordinary cleaning. For very severe service, such as that encountered in school corridors, halls, lobbies, etc., the special J-M Heavy Duty Asphalt Tile Flooring is recommended.

Details on Request

J-M Asphalt Tile Flooring costs no more than other resilient floorings, and in many cases the price is considerably less. For complete details on both Type A and Heavy Duty Asphalt Tile, send for Brochure FL-20. Address Johns-Manville, 22 East 40th Street, New York, N. Y.

J-M Asphalt Tile Flooring is ideal for use in all school and university locations

J-M Built-up Roofs are permanent, weatherproof, fire-resistant

J-M BONDED BUILT-UP ROOFS

Fireproof — weatherproof — rot - proof—durable—those are the outstanding features of J-M Bonded Built-up Roofs. Built up of alternating layers of asphalt-saturated asbestos felt and roofing asphalt, they combine two of the most durable materials known to science — provide permanent protection and virtual freedom from maintenance on all types of school and university buildings.

Will Not Dry Out

Asbestos fibres differ from organic fibres in that they are solid, non-capillary. In J-M Roofing felts they form a solid stone blanket that prevents the evaporation of the lighter oils in asphalt and preserves their waterproofing qualities indefinitely, despite the drying out action of the sun. Hundreds of J-M Built-up Asbestos Roofs, after more than twenty years of virtually maintenance-free protection against fire, sun and weather, are still in excellent condition.

J-M Roofinsul

J-M Roofinsul is a strong, rigid, light weight insulating material for use under J-M Built-up Roofs. It retards the passage of heat through the roof, making top floors more comfortable in summer and saving fuel in winter.

Complete Details on Request

Johns-Manville offers over thirty types of built-up roofs, both smooth and slag or gravel surfaced at a complete range of prices. For complete information on the entire subject of built-up roofs ask for the new brochure, "J-M Bonded Built-up Roofs." Address Johns-Manville, 22 East 40th Street, New York, N. Y.

THE CELOTEX CORPORATION

919 N. Michigan Avenue
Chicago, Illinois

QUIET VIA CELOTEX ACOUSTICAL TREATMENT IS AN ECONOMICAL AID TO MODERN SCHOOLS

Noise knows no grades. From kindergarten to college, noise can interfere with study, teaching, and learning. Noise in classrooms is a detriment to students of all ages. Celotex Acoustical Service will show you how noise can be subdued permanently with Celotex Acoustical Treatment.

CELOTEX ACOUSTICAL SERVICE

The roll call of American schools that have successfully relied on Celotex noise-quieting and acoustical correction in the past sixteen years is long and impressive. Whenever and wherever requested, The Celotex Corporation has gladly contributed its completely informative catalogs to schools and universities; and when convenient, speakers from the Celotex Acoustical Engineering Staff have been supplied to lecture on Architectural Acoustics.

In every part of the United States and in Canada (Dominion Sound Equipments, Ltd.) there is established an exclusive distributor for Celotex Acoustical Products. These independently owned and operated concerns provide prompt, efficient, and dependable service in analyzing acoustical problems, recommending the proper material and application, and submitting estimates. The manufacturer is able by this means to assure users of capable, conscientious responsibility for results.

Though the cost of complete acoustical treatment of your entire school building may exceed present available funds, a start toward noise reduction can be made by using Celotex Acoustical Products at small cost in your most troublesome areas. Such areas may include the band practice room, typing rooms, certain corridors, or the gymnasium. Why not let us survey your school and suggest proper acoustical treatment where it is needed, with estimates for budget purposes?

WHEN LIGHT REFLECTION IS IMPORTANT BE SURE YOU CAN PAINT THE ACOUSTICAL MATERIAL YOU BUY

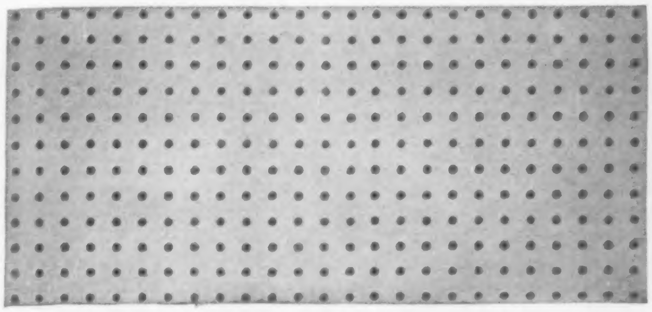
Painted Acousti-Celotex may be washed and cleaned to renew light reflection values until painting is necessary. Note how holes are always kept clear of paint, thus assuring constant and permanent maintenance of original noise-deadening properties

Q-T DUCTLINER

REG. U. S. PAT. OFF.

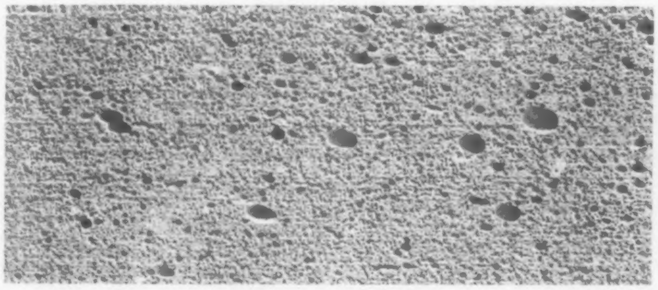
Q-T Ductliner is an acoustical material designed especially to absorb noise in air conditioning ducts. Prepared in rigid block form, made of mineral wool and a special binder, it will not smolder or support combustion.

CELOTEX ACOUSTICAL PRODUCTS

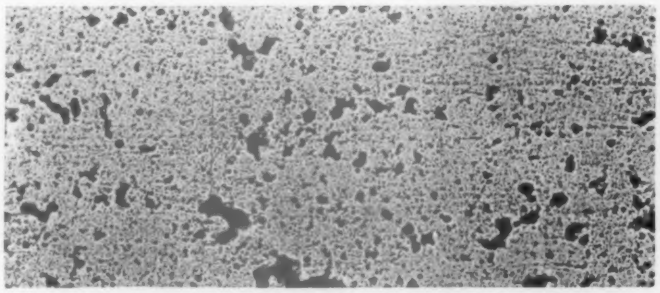


ACOUSTI-CELOTEX is the identifying trademark of a perforated fibre (cane or mineral) acoustical tile, in which the perforations are of controlled diameter, depth, and spacing. This feature insures uniform performance and practical repaintability without loss of absorption

ACOUSTI-CELOTEX

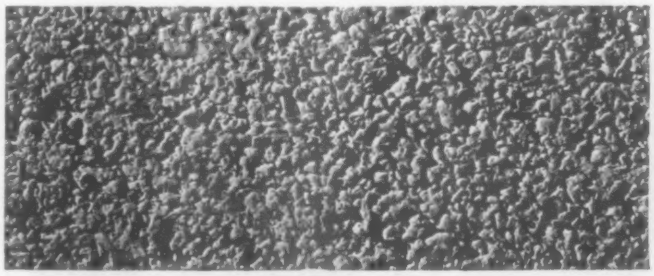


MUFFLETONE — Standard

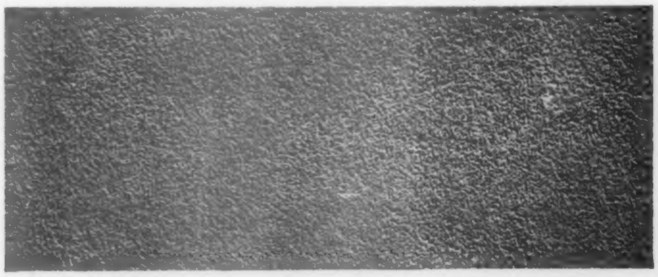


MUFFLETONE — Fissured

MUFFLETONE is the name of our precast, porous gypsum tile, available in a variety of integrally mixed, beautiful pastel colors

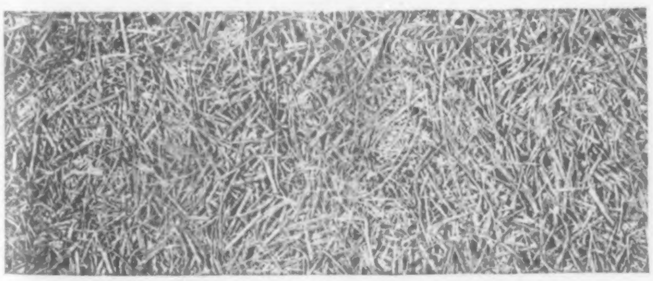


CALICEL



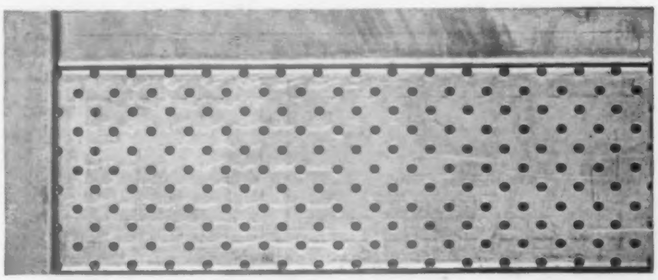
CALISTONE

CALICEL and CALISTONE—sound-absorbing artificial stone. In Calicel, the natural beauty of the expanded mineral aggregate is retained by means of a transparent binder; in Calistone, the Portland cement binding agent adds unusual moisture-proofness to the same porous mineral aggregate. Especially desirable for wall treatment



ABSORBEX

ABSORBEX is made of rugged wood fibres, protected and bound together with a fire-resistant binder



ACOUSTEEL

ACOUSTEEL is paintable, perforated steel tile enclosing a sound-absorbing element of incombustible mineral fibre

Play yard in Crescent School, Pittsburgh, Pa., uses Celotex Traffic Top to provide a resilient, durable surface to walk and play in.

SCHOOLS FIND NEW DURABILITY FOR FLOOR AND ROOF SURFACES IN

CELOTEX TRAFFIC TOP

REG. U. S. PAT. OFF.

Celotex Traffic Top is a modern, attractive, resilient surface material for foot traffic. It magically transforms flat roof areas and courtways into safe playgrounds for children, recreational centers for adults. Weatherproof, it provides an ideal surface for open air areas, as well as a resilient, insulating surface for interior use, such as school corridors, basement recreation rooms, gymnasiums and ramps.

Celotex Traffic Top is made of genuine Celotex Cane Fibre Board, saturated with special asphalts. It is available in various painted finishes, or it may be painted after installation. It is light in weight, easily applied to new or old surfaces. It passes fire brand tests, thereby providing an extra measure of safety. No crevices or protrusions to trip children or catch ladies heels—its soft surface prevents abrasion and cuts usually suffered by children playing on hard, unyielding surfaces. This material is also proofed against Termites and Dry Rot by the exclusive Ferox Process.

With Celotex Traffic Top used on your flat roof areas, open air courtways, badminton courts, gymnasiums, aisleways, ramps, basement recreation rooms, you will provide the final touch of modern comfort for students and faculty alike. Ask us about Traffic Top for your school.

BUILT-UP ROOFING AND ROOF INSULATION

For top floor comfort the year around, for savings on fuel costs, Celotex Cane Fibre Roof Insulation offers a lasting investment that pays dividends. Used with Celotex Built-Up Roofings, manufactured to meet Federal and A.S.T.M. specifications, your school roofs will provide permanent protection, comfort, and economy. School authorities are urged to consider a complete Celotex Roofing job for new or existing schools.

WOOD CONVERSION COMPANY

Manufacturers of

NU-WOOD Interior Finish . . . and
BALSAM-WOOL Sealed Insulation

St. Paul, Minnesota

NU-WOOD KOLOR-FAST—High Sound Absorption

NU-WOOD STA-LITE—High Light Reflection

NU-WOOD Insulating Interior Finish— KOLOR-FAST and STA-LITE

Nu-wood (Kolor-Fast and Sta-Lite) Interior Finish is a wall and ceiling covering for all types of school rooms. It is available in many sizes, shapes and colors, making possible unlimited designs and color combinations. Nu-Wood builds beautiful pre-decorated interiors, insulates against heat and cold, improves acoustics and reduces noise.

Nu-Wood Interior Finish is a distinctly different product available in Tile, Plank, Board and Wainscot. Each unit is designed to fit mechanically and harmoniously with the other—the completed job having the following outstanding qualities:

1 **TEXTURE.** A unique textured surface which gives walls and ceilings a rich, velvety appearance. A matte surface which reflects light without glare or "Hot Spots."

2 **A NEW, EXCLUSIVE JOINT** treatment on plank and tile which results in a superior application. The tongue and groove eliminates breathing—improves insulation value. The shallow bevel reduces the shadow line in keeping with today's interior decoration technique.

3 **INVISIBLE NAILING** made possible by the new Nu-Wood Clip System.

4 **THERMAL INSULATION.** Nu-Wood brings added insulation to the school building, reducing school bills in winter and providing greater coolness in summer. Thermal conductivity .324.

5 **ABSORPTION VALUE.** Nu-Wood absorbs sound, quiets noise, improves hearing.

6 **EASY APPLICATION.** Nu-Wood can be applied directly over cracked plaster or other disfigured walls. In new construction it may be applied to furring strips or framing members.

7 **PERMANENCE.** Nu-Wood requires no maintenance other than occasional cleaning with rubber sponge.

8 **LOW COST.** With these advantages—decoration, acoustical treatment and insulation—Nu-Wood is surprisingly low in cost.

KOLOR-TRIM MOLDING. Pre-decorated wood moldings are especially designed to harmonize with various Nu-Wood shades. They add the finishing touch which makes each job superior in style. Kolor-Trim Moldings make it possible for the carpenter to do the complete interior finish job at low cost.

NU-WOOD KOLOR-FAST

FADEPROOF BEAUTY. For the first time in an insulating interior finish, Nu-Wood Kolor-Fast offers colors which have been pronounced fadeproof by nationally recognized testing laboratories.

HIGH SOUND ABSORPTION. Unlike an ordinary coated board, the exclusive manufacturing process maintains the original high sound absorption of Nu-Wood Kolor-Fast. It quiets noise, corrects faulty acoustics. Sound absorption value .35.

NU-WOOD STA-LITE

LIGHT REFLECTION—76%. The highest light reflection attainable in a commercial product of this type plus a matte surface preferred by lighting engineers.

PERMANENCE. The Florida testing service, after subjecting Nu-Wood Sta-Lite to most severe tests, reports that the surface actually grows lighter with exposure—that most interior finishes turn darker.

SOUND ABSORPTION. Impartial laboratory tests give Nu-Wood Sta-Lite a sound absorption rating of .25—more than enough for a product of this type.

FURTHER INFORMATION ABOUT NU-WOOD KOLOR-FAST AND STA-LITE WILL BE FURNISHED UPON REQUEST

THE AMERICAN BRASS COMPANY

General Offices

Waterbury, Connecticut

ANACONDA THROUGH WALL FLASHING

Why Through-Wall Flashing?

—Because modern skeleton frame construction requires spandrel waterproofing. Quoting from the Kidder-Parker "Architects' and Builders' Handbook":

"Because of the gradual reduction of thickness of exterior walls and the use of hollow-tile construction, wind-driven rain and moisture enter the structure through the face brick and mortar joints. The result is the formation of water pockets, which eventually make contact with ceiling and wall plaster."

Why ANACONDA Through-Wall Flashing?

Anaconda Through-Wall Flashing installed under copings and at the bases of parapet walls, also in side walls at frequent intervals (preferably at every floor and at all openings such as door and window-heads and sills), intercepts all rain water that seeps in and diverts it to the roof or outside face of the wall as desired, making the building walls completely rainproof.

School Architects and School Building Contractors

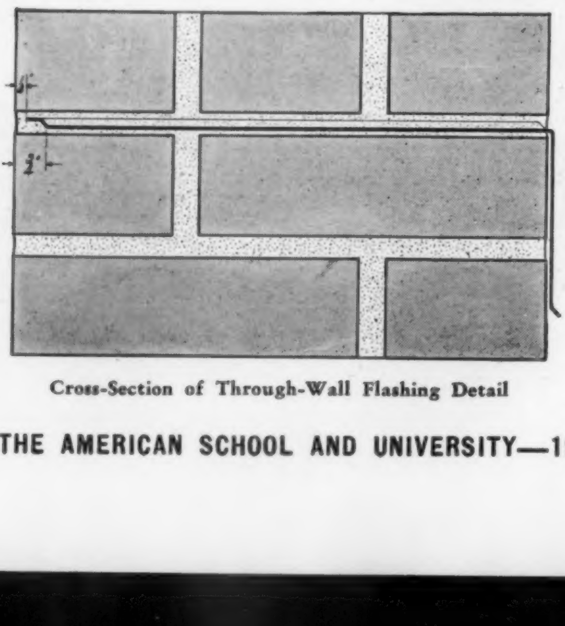
who have used Anaconda Through-Wall Flashing are enthusiastic about its many advantages:

1. The 7/32"-high zig-zag corrugations provide complete bond in the mortar in all lateral directions.
2. The integral dam throughout its length is the full height of the corrugations.
3. The dam and corrugations combine to give complete assurance of drainage in the desired direction. **This flashing will drain itself dry on a level bed,** reducing to a minimum the possibility of wet walls and heaving by frost.
4. **The flat selvage permits neat, sharp bends for counter-flashing or locking to adjacent sheet metal without distorting the flashing or inhibiting free drainage.**
5. Anaconda Through-Wall Flashing is easily locked endwise, even with the selvage preformed, merely by nesting one or two corrugations. This makes the joint watertight.
6. As shown in the illustration at lower left, the design of the dam is such, with its tongue near the top of the mortar joint, that this edge of the flashing can be placed within ¼-inch of the face of the wall and still provide sufficient bed for the pointing of the mortar joint so that it will not chip out. Thus, Anaconda Flashing protects more of the wet portion of the wall than is possible with types having turned-back dams.

Anaconda Through-Wall Flashing is Used in the Yorktown High School, White Plains, N. Y.

One-Piece Inside Corner Flashing.

One-Piece Inside and Outside Corner Flashings are now available for both 8" and 12" walls. They are so designed that the corrugations will interlock with those of adjoining straight flashings. Installation is simple: A corner is flashed by first assembling the three flashing pieces, then marking their exact position on the masonry. The pieces are then removed and a thin bed of mortar spread on the wall, after which the straight flashings are laid and imbedded in the mortar. The corner flashng is put on last, lapping the straight flashings by two corrugations.



Cross-Section of Through-Wall Flashing Detail

Anaconda Through-Wall Flashing is efficient, positive and durable, yet relatively inexpensive. It is readily adaptable to practically every masonry condition.

The principal feature of its design is the series of zig-zag ridges 7/32" high intersected at one end by a 7/32" longitudinal ridge which acts as a dam, causing any accumulation of water to flow to the opposite face of the wall.

The zig-zag ridges prevent lateral movement in any direction. The possibility of vertical movement may be disregarded, as a properly designed masonry wall has its mass and weight so proportioned in relation to wind and other forces that uplift does not occur under any normal condition except as a result of heaving by frost which, if of sufficient force to cause vertical movement of the wall or coping, would be sufficient to break the bond between masonry, mortar and flashing of any design. Actually, **Anaconda Through-Wall Flashing assures minimum risk of heaving by frost as it is so designed that it will drain itself dry on a level bed.**

Anaconda Flashing is available in a variety of types and sizes, made of 16-ounce Anaconda copper, either plain or lead-coated as required. All standard types for 8" and 12" walls are carried in stock in 5-foot and 8-foot lengths.

Because it can be bent and cut to fit on the job, Anaconda Through-Wall Flashing can be installed easily and quickly, with a minimum of delay to bricklayers and masons. Tight end joints can be made by overlapping one or two corrugations.

Detailed information is contained in Anaconda Publication C-28-s. Copies available upon request.

THE BARRETT COMPANY

Manufacturers of Roofing and Waterproofing Materials

40 Rector Street, New York, N. Y.

2800 So. Sacramento Avenue
Chicago, Illinois

Birmingham
Alabama

PRODUCTS

Roofing Materials—For Flat Surfaces: Barrett Specification Pitch and Felt Roofs, Black Diamond Pitch and Felt Roofs. Tarred and Asphalt Saturated Felts and Fabrics, Coal-Tar Pitches, Asphalt Cements, etc.

For Steep Surfaces: Barrett Steep Roof Pitch and Felt Roofs, S.I.S. Roofing, Anchor and Crystal Brand Asphalts. Barrett Asphalt Shingles and Roll Roofings. Roof Cements and Coatings.

Miscellaneous: Waterproofing for foundations, swimming pools, tunnels, floors, etc., special specifications submitted. Rock Wool Insulation, Insulating and Building Papers, for sheathing, lining, etc. Dampproofing and Protective Paints, Wood Preservatives. Tarvia-lithic for playground surfacing, roadways, paths and tennis courts. Roof Drain and Vent Connections.

For complete information about these and other products, write The Barrett Company, 40 Rector Street, New York City.

UNIVERSALLY RECOGNIZED AS THE GREATEST NAME IN ROOFING

Architects, engineers, school board members, university executives — just about everyone who has had experience in buying school roofs—know that the Barrett Specification Roof is tops in safety and service. That is why so many of the country's finest school and university buildings, as well as factories and office buildings, are covered by Barrett Specification Roofs.

There is no safer roof, because the gravel or slag surface is immune to fire hazard caused by flying sparks or embers. Barrett Specification Roofs take Fire Underwriters' Class A rating. The alternate layers of tar-saturated felt and coal-tar pitch make the roof completely and lastingly waterproof —for pitch is one roofing compound that is actually preserved by water. Barrett Specification Roofs are applied by Barrett Approved Roofers, selected with the utmost care on the basis of their experience, ability and business integrity. The roofs are bonded for periods up to 20 years against repair and maintenance expense and built to last.

ROOF INSPECTION FREE

For many years, The Barrett Company has offered building owners an unique service that has been the means of saving many thousands of dollars in upkeep expenses. On request, a Barrett Roof Inspector will make a careful survey of your roofs, flashings, copings, parapets, etc., and render a complete unbiased report. This service is free on buildings with roof areas of 5,000 square feet and up, located east of the Rockies.

Barrett Specification Roofs

The Macomber High School for Boys, Toledo, Ohio, is one of twenty-five school buildings in Toledo and vicinity Barrett-roofed by Fred Christen & Sons, Barrett Approved Roofer; Supervising Architect: Mr. Edwin Gee; General Contractor: Henry J. Spieker Company. All of Toledo.

THE PHILIP CAREY COMPANY

Manufacturers of

Roofing and Waterproofing Products, Heat Insulations

Lockland, Cincinnati, Ohio

SPECIFY

Carey ROOFS

FOR LASTING PROTECTION

The roof of a school building represents little more than 1% of the total construction cost yet on its durability and weather-resisting qualities depend the protection of the other 99%. The school roof should be designed and built to last the life of the building. Re-roofing is an expense that need not be incurred under ordinary conditions if the right roof is selected and properly constructed.

Carey Roofs meet every requirement for modern school construction. For more than sixty years Carey Roofs have been specified for important public buildings throughout the United States, and their application to new school construction is increasing year by year because they have proved their durability and lasting protection against weather.

The quality of materials entering into Carey Built-Up Specifications are carefully checked by our engineering department and research laboratory, allowing a liberal factor of safety as to tensile strength, number of plies and thickness of plies, to assure adequate and permanent weatherproof protection.

FREE ROOF SURVEY

The Carey Roof Survey Plan has been in operation for several years and has been the means of cutting roofing upkeep expense to a minimum. Without obligation on your part, a Carey Inspector will make a careful survey of your roofs, flashings, parapets, etc., and give an honest and impartial report on their condition.

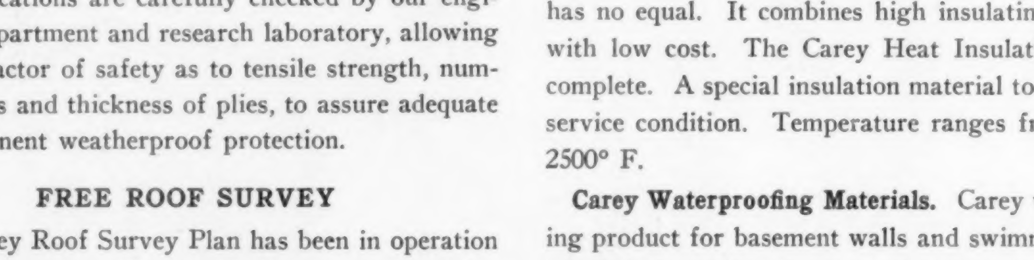
Carey Asfaltslate Shingles represent the standard of quality in composition shingles. They are built especially rugged and substantial to give extra years of trouble free service. They are proof against all ordinary fire risks and need no paint or other upkeep expense. Be sure to see the Carey Cork Insulated Shingle which is constructed to provide roof insulation that is automatically applied at the same time the roof is put on.

Careystone Asbestos Cement Shingles. Made of asbestos and cement, it provides a permanent roof possessing natural properties that enable it to resist the destructive influences of time, weather and fire.

Carey Heat Insulations. For low pressure steam or hot water heating systems, Careycel Pipe Covering has no equal. It combines high insulating efficiency with low cost. The Carey Heat Insulation Line is complete. A special insulation material to meet every service condition. Temperature ranges from zero to 2500° F.

Carey Waterproofing Materials. Carey waterproofing product for basement walls and swimming pools; Protective coatings to repair leaks and prolong the life of all types of roofs, protection paints for hot and cold metal surfaces.

For complete information on Carey Roofs and other products, write The Philip Carey Company, Lockland, Ohio.



The RUBEROID Co.

Executive Offices: 500 Fifth Avenue, New York, N. Y.

DIVISIONAL OFFICES

NEW YORK BOSTON (MILLIS) ERIE BALTIMORE MOBILE MINNEAPOLIS

RU-BER-OID
ROOFING AND BUILDING PRODUCTS

RU-BER-OID BUILT-UP ROOFS

BEDFORD COUNTY HIGH SCHOOL
Shelbyville, Tenn.
Protected with 23,500 sq. ft. RU-BER-OID Bonded coal tar pitch, felt and gravel Built-up Roofing
Architect: Marr & Holman, Nashville, Tenn.
Approved Roofer: Asbestos Products Co., Nashville, Tenn.

Free Catalog

BUILT-UP ROOFS

RU-BER-OID Built-up Roofs are recommended for flat surfaces or roofs with a slight pitch. There are four popular types of RU-BER-OID Built-up Roofing: Asbestos felt and asphalt, coal tar pitch and tarred felt, asphalt felt and asphalt, and the combination roof consisting of asphalt felt, asphalt-saturated asbestos felt and roofing asphalt. You can choose the proper type to meet climatic conditions, anticipated life of building—*fire hazards, construction of roof decks,* etc.

When desired, RU-BER-OID Built-up Roofs are bonded for 10, 15 or 20 years, depending upon the specifications. Bonded roofs are applied only by Approved Ruberoid Roofing Contractors. Complete catalog will be mailed upon request.

Free Catalog

INSULATING MATERIALS

From the viewpoint of efficiency, Rock Wool is one of the finest insulating materials. Ruberoid offers you Rock Wool in three forms—loose or bulk for packing, granulated for pouring and in pre-formed bats for use between joists, rafters and studding. Complete data will be gladly forwarded upon request. Send for free catalog.

ASBESTOS-CEMENT SHINGLES

For pitched roofs, where beauty is a factor, where a roof must be weatherproof, fireproof, rotproof and time-defying—Eternit Asbestos-cement Shingles win favor with the architect. These shingles, Ruberoid-made, come in various finishes, designs and colors.

Gothics

ETERNIT GOTHICS

Eternit Gothic Asbestos Cement Shingles are textured like natural rock. Tapered with a heavy butt, the Gothic Shingle lies perfectly, giving the effect of massiveness and yet without the burden of extra weight. Eternit Gothics are furnished in random widths and may be applied with staggered butts. The shingle is 12" wide and 16" long with approximately ¼" butts. Applied with 7" x 12" exposure. Weight approximately 525 lbs. per square.

ETERNIT TIMBERTEX

The companion Asbestos-cement Shingle is Eternit Timbertex. This product reproduces the lovely texture of weather-aged cypress. It has all the qualities of Gothic, but gives the effect of mellowed wood. Its size is 8" x 16", with approximately ¼" thick butts. The exposure is 8" x 7" and the weight is 525 lbs. per square.

Timbertex

ASBESTOS PIPE COVERINGS

The Ruberoid Co. has a complete line of heat and cold insulating products, including Asbestos and 85% Magnesia Pipe Coverings, Asbestos Papers, Sheet and Block Insulations, Insulating Cements, etc. A catalog covering RU-BER-OID Insulating Materials will be gladly furnished upon request.

85% Magnesia Pipe Covering

ASPHALT SHINGLES

Where a less expensive, yet durable, fire-resisting roof is required, Ruberoid offers Asphalt Shingles in various weights, colors and attractive designs. Full descriptive literature upon request.

For Complete information write to School Engineering Department, The RUBEROID Co., 500 Fifth Avenue, New York, N. Y.

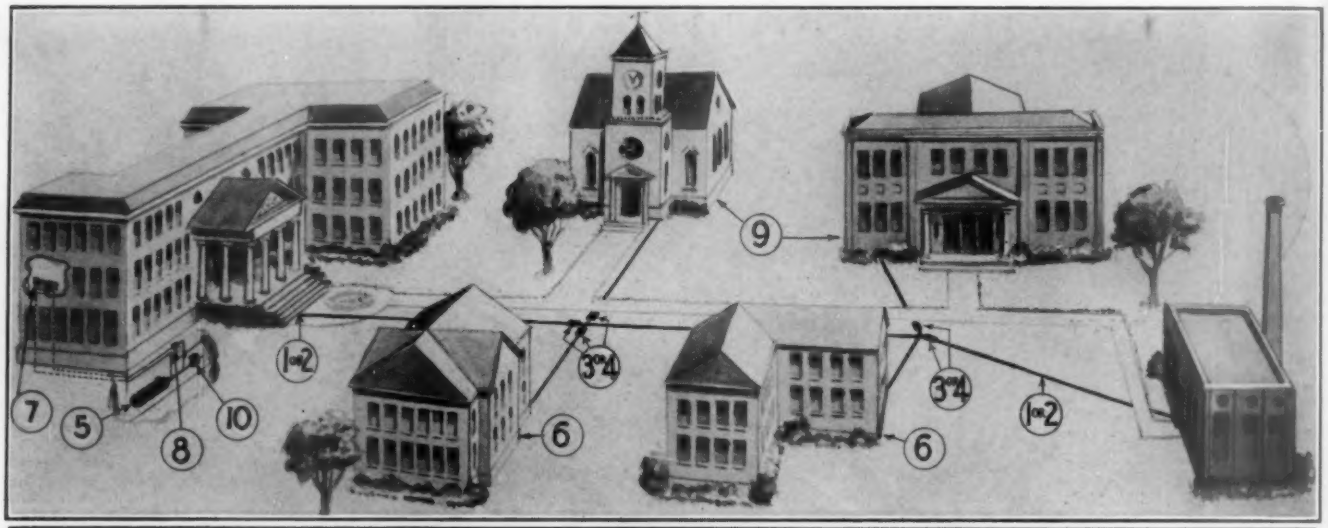
AMERICAN DISTRICT STEAM COMPANY

IN BUSINESS OVER SIXTY YEARS

Manufacturers of District Steam Heating Equipment and ADSCO Water Heaters

North Tonawanda, N. Y.

BRANCHES AND AGENTS IN PRINCIPAL CITIES



(1) RED DIAMOND WOOD CASING	(3) ADSCO SLIP TYPE EXPANSION JOINT	(5) STORAGE TYPE WATER HEATER	(7) RADIATOR VALVES	(9) REDUCING VALVES
(2) ADSCO-BANNON TILE CONDUIT	(4) ADSCO PACKLESS EXPANSION JOINT	(6) INSTANTANEOUS WATER HEATER	(8) VERTICAL STEAM TRAP	(10) ROTARY CONDENSATION METER

ADSCO PRODUCTS Assure Dependable Heating Efficiency for Campus Steam Distribution Line Extensions or Replacements

Specified by Architects and Engineers

When planning new college buildings to be heated by an underground steam line extension from a central heating plant, many college architects and engineers take their specifications for the mechanical equipment from the ADSCO Catalog No. 35. It gives **complete** information from a **single book** on ADSCO Slip and Packless Types of Expansion Joints, ADSCO-Bannon Tile Conduit or Wood Casing for underground steam lines, Condensation Meters, Water Heaters, Pipe Supports, Steam Traps, etc. Send for your copy today.

Approved by Superintendents of Buildings

Superintendents of college buildings, responsible for the efficient operation of mechanical equipment costing thousands of dollars, approve ADSCO Products for steam distribution based on many years of favorable operating experience with ADSCO equipment. To them, an ADSCO specification means assured operating efficiency with a minimum of maintenance.

When new or replacement equipment is required they consult the ADSCO Catalog No. 35 **first** when requisitioning or purchasing steam distribution equipment.

Purchased by College Business Managers

College business managers and purchasing agents buy ADSCO Products with confidence for their campus steam distribution lines.

When new expansion joints, tile conduit, wood casing, condensation meters, water heaters, steam traps, radiator valves or other equipment is required, the **first** buying source is ADSCO to secure dependable products, reasonably priced with prompt delivery assured.

The ADSCO Catalog No. 35 illustrating and describing our equipment should be on every business manager's desk. If you do not have one, please request your copy promptly.

PARTIAL LIST OF USERS OF ADSCO PRODUCTS IN THE SCHOOL AND UNIVERSITY FIELD

Alfred University	Harvard University	Pennsylvania State College	University of Dayton	University of Texas
American University	Howard University	St. Bonaventure College	University of Florida	University of Toronto
Arkansas State College	Iowa State Teachers College	State College of Wash.	University of Maryland	University of W. Virginia
Barnard College	Juniata College	State Univ. of Iowa	University of Minnesota	University of Wisconsin
Bucknell University	Louisiana State University	Syracuse University	University of Montana	University of Wyoming
Carleton College	Michigan State College	Temple University	University of North Carolina	University of Utah
Columbia University	Middlebury College	Tufts College	University of Pittsburgh	Vassar College
Cornell University	Monmouth College	Union College	University of Rochester	Wellesley College
Dartmouth College	Pa. State Teachers College	University of Arizona	University of Tennessee	Williams College

THE TEXAS COMPANY

Manufacturers of

TEXACO *Asphalt* ROOFINGS and SHINGLES

TEXACO ROOFING DEALERS EVERYWHERE East of the Rockies

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Atlanta, Ga.
Buffalo, N. Y.
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New Orleans, La.
New York, N. Y.

Norfolk, Va.
Indianapolis, Ind.
(Indian Refining Company)

CHECK THESE FACTS ABOUT THIS WELL KNOWN BRAND OF ROOFING . . . FOR INSTITUTION USE

Economical: Dollar-for-dollar, today's Texaco roofing buyer gets a better, longer-life roof than ever before.

Attractive: Texaco Asphalt Shingles are available in colors and patterns that will blend with, and enhance the beauty of, the buildings they cover.

Fire resistant: The Fire Underwriters' Label of inspection is on every bundle. A fire resistant Texaco Roof may even permit a reduction in insurance rates . . . dependent, of course, on local conditions.

Water and weather resistant: The reason is self evident . . . asphalt is the greatest weather and water proof substance in the world today.

Meets rigid requirements: Texaco Roofing Products meet U. S. Army, Navy and other governmental specifications—have proved their ability to meet or exceed structural specifications for educational buildings, whether for new work or reroofing.

Most popular type: U. S. Department of Commerce statistics show that asphalt roofing products are America's favorite . . . almost 2 to 1 . . . over all other types combined.

Reputation of integrity: Texaco Roofing Products must and do maintain the standards of quality and dependability established for each of the more than 350 petroleum products made by The Texas Company.

Quickly available: School authorities know the widespread distribution facilities of The Texas Company. They are thus assured, through their local Texaco Roofing Dealer, of prompt deliveries and helpful cooperation.

FOR COMPLETE DETAILS AND SAMPLES, COLORS AND SPECIFICATIONS SEE THE NEAREST TEXACO ROOFING DEALER OR WRITE TO THE NEAREST OFFICE OF THE TEXAS COMPANY.

TEXACO *Asphalt* ROOFING PRODUCTS

- Mineral Surfaced Shingles
- Mineral Surfaced Roll Roofing
- Smooth Surfaced Roll Roofing
- Asphalt Saturated Felt
- Plastic Asbestos Roofing Cement
- Asbestos Fibre Roof Coating
- Liquid Asphalt Roof Coating
- Solid Roofing Asphalt

. . . Made with Texaco's Own Asphalts—99½% Pure

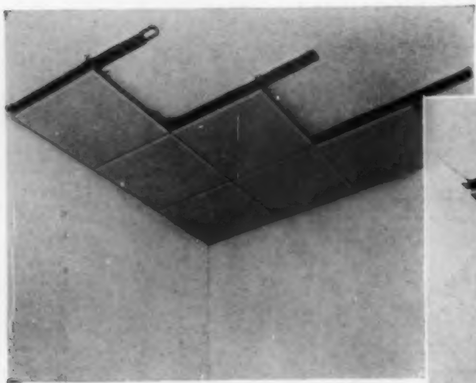
THE LOXIT COMPANY

605 W. Washington Blvd., Chicago, Illinois

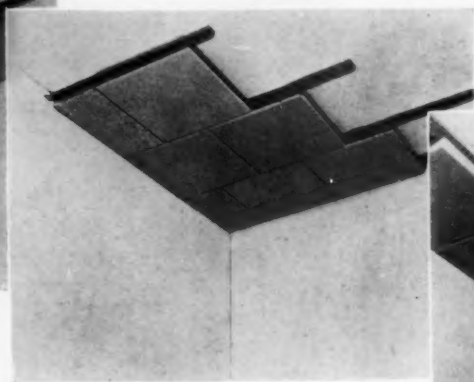
LOXIT ACOUSTICAL SUSPENSION SYSTEMS

(Patents Issued and Pending)

3 EXAMPLES OF TYPE I



Type 1-A
Straight edge tiles laid with matched joints using Loxit channels and double wing clips



Type 1-B
Straight edge tiles laid with staggered joints using Loxit channel and single wing acoustical clip

Type 1-N
Straight edge tiles laid on wood furring strips with staggered joints using Loxit wood furring clips

Note on wall, double wing wood furring clip for matched joints
Type 1-M

THERE ARE THREE TYPES OF LOXIT ACOUSTICAL SUSPENSION SYSTEMS

TYPE 1—Straight edged tile system. **TYPE 2**—Kerfed tile system. **TYPE 3**—Surface applied system.

VERSATILITY OF THE LOXIT SYSTEM

If you have an acoustical tile suspension problem you will find the solution in one or a combination of the Loxit suspension methods available for use with straight edged or kerfed tiles and slabs, applied directly to ceilings, walls, beams, ducts, etc., or suspended.

Office of Liquid Carbonic Co. — Type 1-B

Union League Club Grille Room — Type 1-A

In no other system can the architect or acoustical contractor find the solution to all of their acoustical problems.

We do not know of an acoustical tile and slab condition that cannot be solved with the Loxit system.

DETAIL DRAWINGS AVAILABLE

TYPE 1—General sheet showing all type 1 accessories.

Type 1-A—Directly applied system using Loxit channel CH-3 and double wing clips AC-78 setting tiles in a matched pattern.

Type 1-B—Same as above, using single wing clips AC-77 setting tiles in staggered pattern.

Type 1-C—Suspended system using structural furring channels and type 1-A accessories.

Type 1-D—Same as type 1-C except that Loxit suspended ceiling clips AC-90 are used eliminating all structural furring.

Type 1-E—Directly applied system using Loxit 3-piece clips AC-79 for acoustical treatment around beams, ducts, etc.

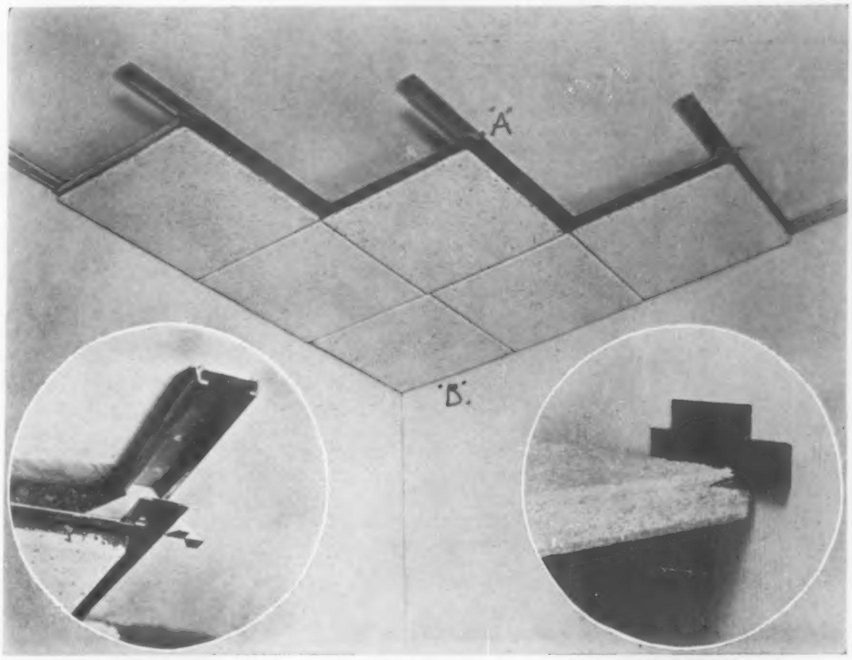
Type 1-F—A combination of types 1-A and 1-B giving a herringbone pattern.

Type 1-G—Same as type 1-A but applied to slabs scored to imitate tile and giving both matched and staggered patterns.

Type 1-M—Directly applied system using Loxit double wing wood furring clips AC-178 in connection with wood furring as applied directly to wood joists, studding, etc., and giving a matched pattern.

Type 1-N—Similar to type 1-M using Loxit single wing wood furring clips Nos. AC177R&L giving a staggered pattern.

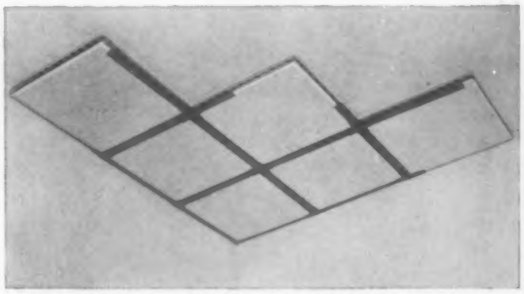
TYPE 2



Detail at "A" **Type 2** **Detail at "B"**
Kerfed tile suspension method. Entire ceiling locked together at all points

Type 2—Kerfed Tile System using Loxit channels, hemmed runners and splines for setting kerfed acoustical tiles and slabs, the splines and runners serving as breathing stops as well as suspension members. This system is complete with wall angle runners and corner clips for the mechanical erection of the border and corner tiles.

TYPE 3



Type 3
This system is a "life saver" where acoustical tiles and slabs have become loose and must be re-set. Available for all sizes of materials; also in other designs

Type 3—A unique system composed of Loxit V strips, crosses, tees, and ells, specially designed to re-set acoustical tiles and slabs in existing installations that have become loose or for the setting of tiles and slabs directly to ceilings and walls by the use of a surface setting method which forms a wall or ceiling pattern at the same time acts as a positive breathing stop. Particularly adaptable to plastered ceilings. This system is available in primed steel sections ready for painting and in stainless steel.

In using this system acoustical tiles and slabs not originally mechanically suspended become permanently fixed in place providing against any further movement or breathing.

ACOUSTICAL TILE AND SLABS—The Loxit Company is not directly or indirectly interested in any type, make, brand, or manufacture of acoustical tiles or slabs. Loxit applies only to the mechanical method of erecting acoustical materials and can be used with any and all materials on the market choosing the type of suspension that is adaptable to the material, taking into consideration whether it is kerfed or straight edged.

A general drawing showing application of the system giving a matched joint pattern is shown.

DETAIL DRAWINGS AVAILABLE

General sheet showing all type 2 accessories.

Type 2-A—Kerfed system giving matched joints.

Type 2-C—Suspended system using structural furring channels and type 2-A accessories.

Type 2-D—Same as type 2-C except that Loxit suspended ceiling clips AC-91 are used, eliminating all structural furring.

Type 2-F—Similar to type 2-A giving a herringbone pattern.

MATERIALS IN LOXIT SYSTEMS—All Loxit devices are fabricated from materials and gauges that have been adapted to meet building codes, government regulations and job conditions.

Loxit devices can be manufactured from other than our standard materials to meet unusual conditions or in accordance with specifications, upon request.

LITERATURE AND SPECIFICATIONS—A complete Loxit catalog describing in detail the various Loxit systems and accessories including full sized details, scale drawings and specimen specifications is available upon request.

TECHNICAL SERVICE—A staff thoroughly trained in the building business is at the disposal of architects and contractors for the study of unusual problems. This service is offered without obligation. Please consult us.

A FEW LOXIT ACOUSTICAL INSTALLATIONS

Liquid Carbonic Company, Chicago
Schneider Bowling Alleys, Elgin, Ill.
Cafeteria, Tilden High School, Chicago
Fourteen Chicago City High Schools
Union League Club, Chicago
Mergard's 20th Century Recreational Bldg., Cincinnati, Ohio
Indiana Village for Epileptics, New Castle, Ind.
Daily Times Building, Chicago

Loxit system showing erection of Loxit channels in suspended installation

LOXIT CHANNELS—Loxit channels are of two sizes: CH-3, 1⅛ x 5/16 in. for suspended installations spanning up to 3 ft. 6 in. using the lighter type of tile. CH-4, 1⅛ x ¾ in. to be used where spans are longer than 3 ft. 6 in. or with heavier type tiles.

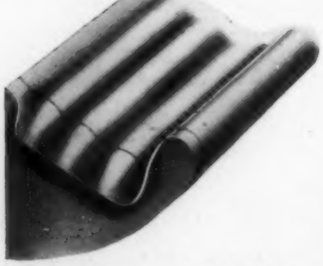
THE LOXIT COMPANY

605 W. Washington Blvd., Chicago, Illinois

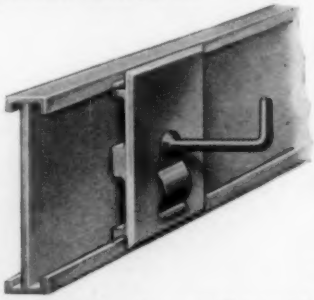
LOXIT ALL-METAL BLACKBOARD AND CORKBOARD MOUNTING SYSTEM

(Patents Pending)

Boyum, Schubert & Sorenson, Architects, LaCrosse, Wis.
Robt. G. Regan Co., Contractors, Chicago, Ill.



Loxit "Sweep-out" End Closure
Note Inclined Chalk Trough



Combination Snap-on Trim and Display Rail

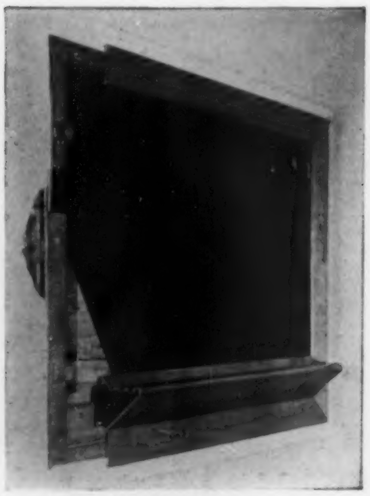


Fig. 1
Loxit blackboard mounting system in place showing construction

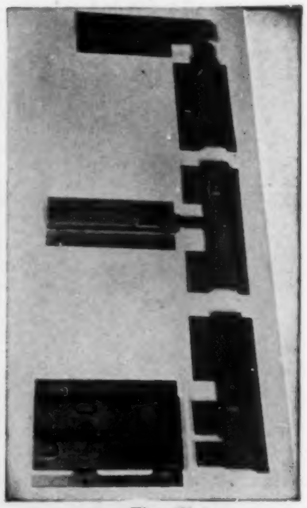
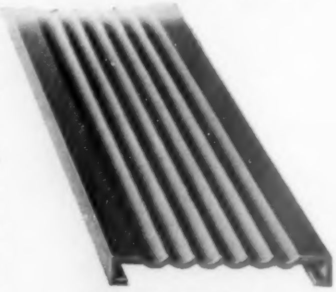


Fig. 2
Loxit blackboard mounting system showing its structural parts in detail

THE SYSTEM—The Loxit system is more than just a ground or trim. It is a complete system combining a plaster ground with snap-on trim, including keys, springs, inserts, and clips to receive and hold the boards and trim, as self-contained units. The system is designed to provide the maximum amount of adjustment, to assure rapid, economical and perfect installation and to maintain the permanent positions of the various parts after erection through automatic cushioning of the boards against reasonable contraction, expansion, settlement, etc.

ERECTION—It is so simple in principle and construction that any good workman can install it with ease and perfection. All grounds are drilled, slotted, and mitered at the factory to board dimensions shown in drawings, ready to set in place. Special alignment braces are provided for all corners, tees, and joints, making the setting of grounds easy and the placing of trim neat and true. The Loxit system can be used with any type and thickness of board from 1/8 in. to 3/8 in. the adjustment for variations in thickness being automatic.



Loxit Fluted Trim
New—Decorative

SPECIFICATIONS—The system employed for this work shall be what is known as the Loxit all metal blackboard system. It shall be installed strictly in accordance with instructions issued by the Loxit Company, 605 W. Washington Blvd., Chicago. Same shall be complete with (or without) apron under chalk trough.

Grounds shall be secured to supporting walls with 10 penny wire cut nails, expansion or toggle bolts, at approx. 12 in. o. c. for blackboards and 18 in. elsewhere as required (or as directed by the architect). Grounds will be set with face flush with plaster line, plumb and true to board dimensions shown on drawings so as to assure the proper alignment for trim and tight closures of trim miters. Grounds shall be fabricated from 18 gauge U. S. S. extra tight coat galvanized sheet steel.

Trim shall be of snap-on design throughout. It shall be (satin finish, factory finish, chromalite finish, specify which is wanted) extruded Chromedge.

After blackboards and cork boards have been set by others, contractor shall apply all trim in a neat workmanlike manner, mitering the corners.

Chalk trough shall be Loxit inclined type (Standard Loxit flat type) with plain (or sweep-out) end closures.

Furnish the following accessories: 1 Pair of Loxit roller brackets for each run of display rail. One combination Loxit map hook and paper clip for each 18 in. of display rail.

LITERATURE—A complete catalog describing the Loxit system in detail is available upon request. Please write us.

TECHNICAL CO-OPERATION—A trained staff is at your disposal without obligation.

THE LOXIT COMPANY

605 W. Washington Blvd., Chicago, Illinois

THE LOXIT FLOOR LAYING SYSTEM

For Standard T&G Wood Floors—Eliminates Nails, Wood Sleepers, Mastic

(Patents Issued and Pending)

A PROVEN, ECONOMICAL SYSTEM FOR ALL TYPES OF BUILDINGS—The Loxit system is a simple mechanical method for laying ordinary strip wood flooring without nails, wood sleepers, or adhesives. It consists of:

(a) A metal channel 1⅛ in. wide by 9/16 in. high with overlapping top edges, punched 4 in. o. c. for fastening.

(b) Uniquely designed clips to be used in laying and locking the floor boards together and to the channels.

ADVANTAGES OF THE LOXIT SYSTEM—

1. Total overall thickness of a Loxit laid floor including 13/16 in. flooring is 1⅛ in.
2. Floor can be laid without expansion joints as the Loxit system limits expansion.
3. Loxit floors can be laid tight, in fact the tighter the better, provided the usual precautions as to building conditions and acclimatization of the flooring have been taken, thereby securing a tight floor to start with.
4. Excessive shrinkage, repairs, and replacements can be easily and economically handled when floors are laid with the Loxit system because they can be taken up and re-laid without waste other than new clips.
5. Squeaks in wood floors are caused by vertical movement. When Loxit channels are properly shimmed and grouted and the floor securely locked into place in accordance with instructions, vertical movement is eliminated and squeaking avoided.
6. Floors may be satisfactorily laid in basements and other areas where other types of wood flooring could not be used by following the simple precautions that are necessary under such conditions.
7. Loxit laid floors require only light sanding.
8. No special milling is required. All flooring milled in accordance with the gauge adopted by the hardwood flooring manufacturers' associations can be used.
9. Loxit being a simple mechanical system of few parts, can be mastered within a few hours by an experienced floor layer. There is only one set of rules to follow and only one way of doing the work properly, the same as any other mechanical assembly. This eliminates guessing, simplifies floor laying, makes supervision easy, and assures uniformly good results.

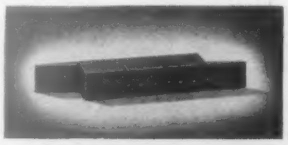
HOW TO USE THE LOXIT SYSTEM—Loxit channels are spaced 12 in. o. c. and lapped at the ends when floor area is more than 10 feet wide. They are secured to sub-floor using a suitable type of anchor, levelled, shimmed, and grouted. The wood flooring is laid in the same way that a nailed floor would be laid, but instead of using nails to fasten the flooring, a cleverly designed metal clip is used. The carpenter slips these clips into the channels immediately ahead of the last board and drives them into place by driving up the next board. The simple operation of driving up the board forces the clips to bite into and over the tongue of one board and embed themselves in the groove of the other, thus securely locking both boards together and to the channel. The tongues of the clips are slotted so that they automatically adjust themselves to the tongue and groove of the flooring.

LITERATURE AND SPECIFICATIONS—A Loxit floor bulletin fully describing the system is available upon request.

TECHNICAL SERVICE—A staff thoroughly trained in building problems is at the disposal of architects.

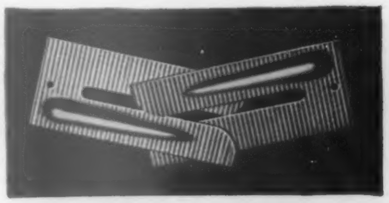
A FEW LOXIT FLOOR INSTALLATIONS

Dormitory U. S. Navy, New Haven, Conn.
Offices U. S. Army, Louisville, Ky.
High School, Taylorville, Ill.
Montgomery Ward store, Sioux City, Iowa
WGN studio stage, Chicago, Ill.
Junior College, Long Beach, Calif.
High School, Boulder, Colo.
General Motors Factory, Bristol, Conn.



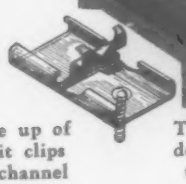
Type 2

LOXIT INTERLOCKING METAL SHIMS—Useful for the shimming of furring, sleepers, joists, girders, jamb lining bases, foundation plates, etc.



Type 1

Patten Gymnasium, Northeastern University, Evanston, Ill. Holabird and Root, Architects. R. C. Wieboldt Co., Contractors



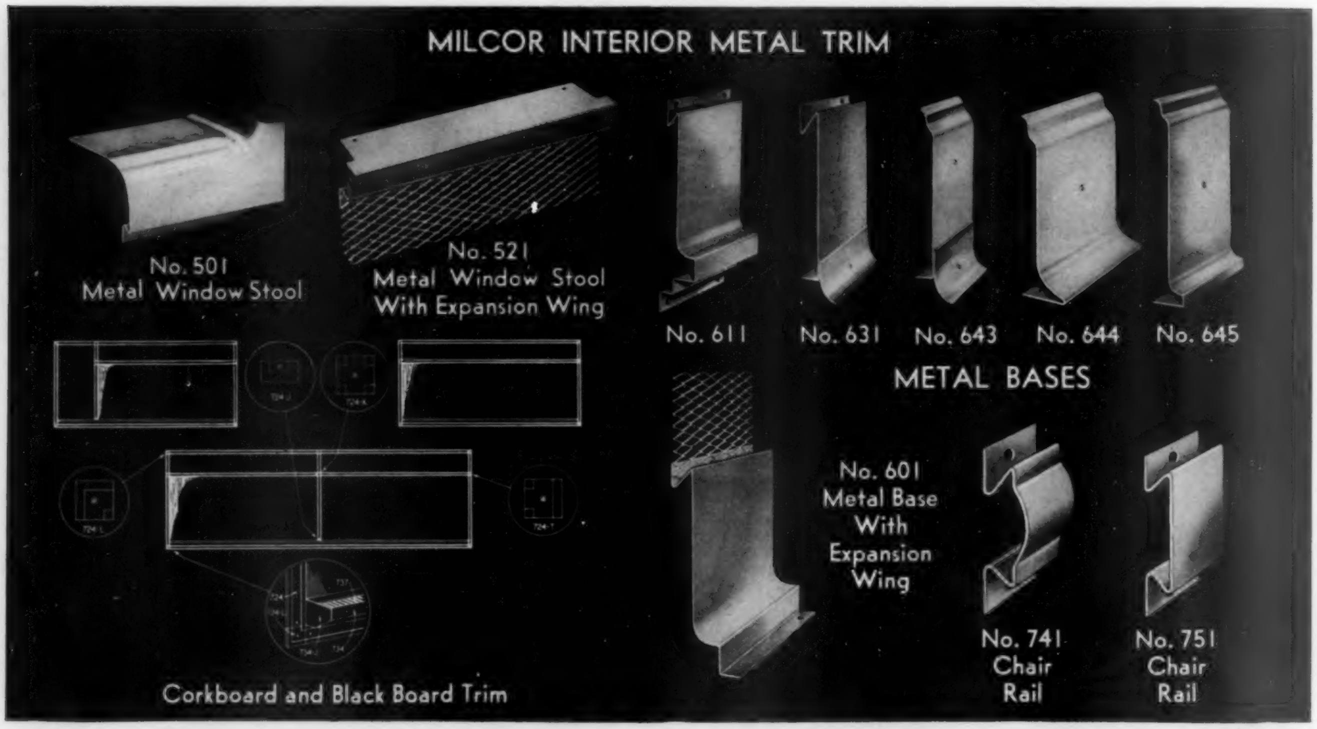
Close up of Loxit clips and channel

The carpenter's weight holds down the floor boards, so that the clips will seat properly

MILCOR STEEL COMPANY

4153 West Burnham Street, Milwaukee, Wisconsin

Canton, Ohio	Kansas City, Mo.	New York City
Chicago, Illinois	Rochester, N. Y.	Baltimore, Md.
La Crosse, Wisconsin		Atlanta, Georgia



METAL TRIM OF UNSURPASSED BEAUTY AND DURABILITY NOW AVAILABLE WITH INSULMAT SOUND DEADENING

- METAL BASES
- METAL COVE MOULDS
- METAL CHAIR RAILS
- METAL BLACKBOARD MOULDS
- METAL CHALK TROUGH

Milcor Metal Trim is the finest interior trim available for modern school construction. Permanence, fire-safety, and resistance to abuse are a few of the reasons why this line has been specified in representative school construction in all parts of the country. Its attractive appearance and exceptional sanitation make it especially adaptable to school use. Every desirable type of interior trim may be found in the complete Milcor line.

The Expansion Wing, which is an optional feature of many Milcor Metal Trim products, provides a permanent plaster bond, preventing checking and cracking of plaster at vulnerable points. And in schools, especially, it is desirable to preserve the original plastered surface.

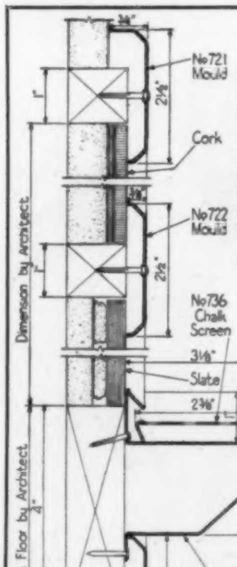
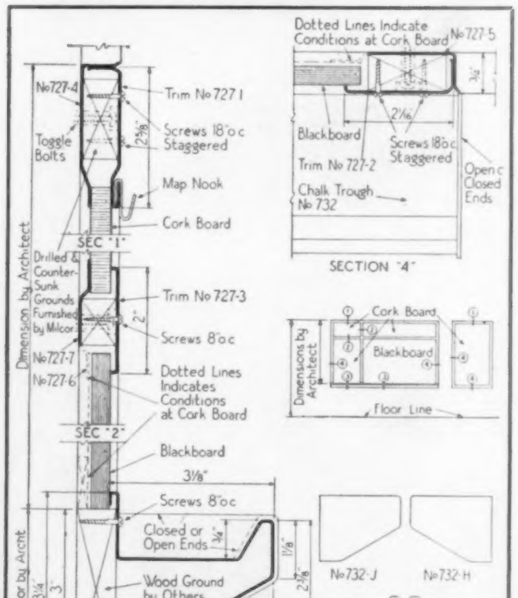


Illustration shows cross-section of No. 735 Chalk Trough with Nos. 721 and 722 Mould. In the new catalog, complete dimensions and working drawings are given for every type of Milcor Metal Trim

Illustration at right shows cross-section view of No. 727 Series Cork Board and Blackboard Trim



Write for the 100-C Milcor Metal Trim Catalog—also for data on Sound Deadening

MILCOR PRODUCTS FOR SCHOOLS

MILCOR VENTILATORS AND SKYLIGHTS

The Milcor "Nu-Air" is a steel top syphon Ventilator. Breakers and deflectors inside the wind band produce positive suction regardless of wind direction, and insure against back draft at all times. Its design takes into consideration all influencing conditions and compels it to function at all times.

The Milcor "Spinner" Ventilator has great exhaust capacity. The slightest breeze keeps it operating efficiently. As the head revolves, the air in the ventilator is expelled creating a vacuum which draws the impure air from the building. Down drafts are an impossibility with this construction.

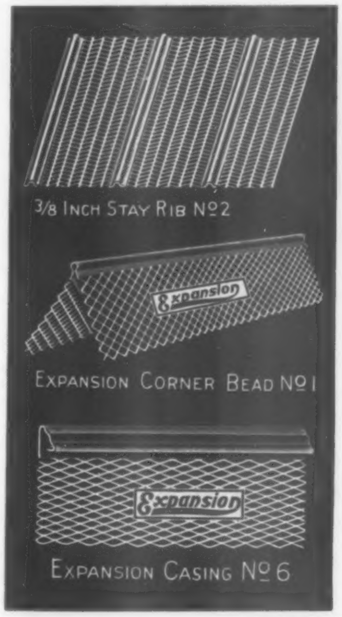
The Milcor Line of Skylights covers all types and sizes. We furnish recommendations to meet special requirements.

Send for literature describing and illustrating Milcor Ventilators and Skylights

"Nu-Air" Ventilator

Milcor Spinner Ventilator (above)

Puttyless Skylight } No. 851



MILCOR FIRE PROOF BUILDING MATERIALS

There is no better plaster base for walls and ceilings of school buildings than metal lath. Its scientifically designed mesh gives it a positive plaster grip. There is no plaster waste with this lath, and yet every inch of wall surface is locked permanently into place.

Expansion Casing provides a practical door and window trim. The flush-type junction of wall and casing insures a sanitary finish, with no cracks to become clogged with dirt.

Milcor Expansion Corner Bead is made for outer and inner angles, and its precisely true nose makes a neat, safe, straight line corner. The Expanded Wing, an integral part of the bead, permits the plaster to key through and form a strong bond with the lath beneath, protecting against corner cracks either from blows or strain due to settling.

Write for the Milcor Manual—for complete information on Fireproof Products

MILCOR PARTITION SYSTEMS

These two systems are important contributions to fire-proof construction. The ease in which they can be constructed reduces labor cost considerably and at the same time makes possible partitions of exceptional rigidity and permanence. Certified fire-resistance makes them the partitions for school construction.

Milcor Steel Stud

MILCOR STEEL STUD FOR HOLLOW PARTITIONS

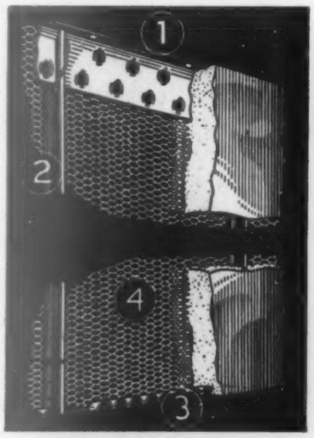
Sound resistance, insulating value, and resistance to shocks and abuse are a few of the outstanding advantages of this system. Write for detailed literature.

MILCOR SOLID 2-INCH PARTITION AND FURRING SYSTEM

Only four units comprise this system:

1. Ceiling Angle Runner
2. Slotted Channel Stud
3. Continuous Crimp Floor Runner
4. Milcor Metal Lath

Its labor saving simplicity reduces cost and speeds construction. Detailed literature supplied upon request.



Milcor
2" Solid Partition and Furring System

STREAMLINE PIPE AND FITTINGS DIVISION

MUELLER BRASS CO.

Port Huron, Michigan

PROTECT THE INVESTMENT FOR THE LIFE OF THE BUILDING BY INSTALLING *STREAMLINE* COPPER PIPE FOR THE PLUMBING AND HEATING SYSTEMS

STREAMLINE bronze solder fittings and copper pipe are a radical departure in conducting systems for plumbing, heating or industrial use. Their unique method of connection has made it possible to use copper piping of hard temper and of a sufficient wall thickness to meet all requirements of actual service. This is in direct contrast to threaded copper pipe, which had to carry a very heavy wall to insure a sufficient thickness to meet service conditions after this thickness had been cut away approximately 50% in the fabrication of the thread. Threaded copper pipe for this reason is naturally very expensive and gives no extra service for its additional wall thickness on the unthreaded portion.

STREAMLINE Solder Fittings are manufactured under U. S. Patents 1,770,852; 1,776,502; and 1,890,998

Illustrating Mechanical Features of the STREAMLINE Fitting

STREAMLINE solder fittings and copper pipe are installed at a price very slightly in advance of rustable materials.

STREAMLINE fittings and copper pipe are ideal for use in all types of educational buildings for all general plumbing and heating purposes: for steam supply, condensate return, cold water, drinking water supply and return, and hot water supply and return piping. Among the many advantages are:

No rusting or clogging—No discoloration of water from scale or rust, nor any decrease in volume or pressure such as is invariably found after a few years with corrodible materials.

Light Weight, yet great strength—The STREAMLINE solder fitting, less heavy and consequently less expensive for any given size, produces a connection that is enormously strong and leakproof.

Minimum space required—Although STREAMLINE solder fittings produce enormously strong joints, they are very little larger than the pipe lines which they connect. They do not protrude like screw type fittings. Since these fittings are not screwed into place when connected to the pipe and no space is required for wrench handling, etc., they can be installed very close to each other, thus saving considerable space.

Leaks due to vibration eliminated—Constant vibration has no effect on a joint made with STREAMLINE solder fittings. Its effects are not localized as is the case with screw type fittings, but are harmlessly dissipated throughout the system.

Visual proof an exclusive feature of the STREAMLINE Fitting.—When the mechanic installs STREAMLINE he can tell at a glance that the joint he has made is permanently leakproof without an actual pressure test. This is a valuable asset especially in concealed work.

The STREAMLINE solder fitting is not connected by threading or flaring but by soldering, utilizing one of nature's laws—capillary attraction—to form a permanently tight joint of great strength. The joint, in contrast to threaded connections, is actually reinforced and is the strongest point in the line, instead of the weakest.

Cut-away Sectional View of STREAMLINE Tee. Note How Pipe Is Recessed Into the Fitting, Resulting in a Uniform Smooth Waterway

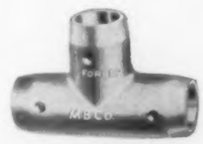
The illustration herewith shows the mechanical features of the STREAMLINE solder fitting. After the joint has been fluxed and assembled in the pipe, it is heated and solder introduced through the feed hole. Capillarity immediately distributes it thoroughly and evenly between the bonding surfaces, producing a joint so strong that in a pulling test, the pipe will actually break while the joint remains without the slightest damage. It requires over 9000 pounds of pull even before the fracture in the pipe occurs. This, of course, is away beyond anything required of it in actual service.

ESPECIALLY RECOMMENDED FOR HEATING PLANTS

STREAMLINE hard copper pipe and fittings are particularly recommended for all heating plants—whether by hot water or steam—a special virtue of copper pipe being its capacity to hold heat with a minimum of radiation, yet to conduct it very rapidly, so that there is a minimum loss of heat when being conveyed from the point of generation to the points of distribution. Since copper cannot rust, the original delivering capacity of STREAMLINE pipe remains the same indefinitely. In all heating plants, we claim greatly increased benefits in all installations made with STREAMLINE, with noteworthy savings in both fuel and material.

Coupling

STREAMLINE pipe and fittings are installed in over four hundred schools and colleges throughout the United States and, in fact, in every type of building construction. They have been specified by leading architects everywhere.



Tee

Elbow

STREAMLINE fittings are furnished in complete range from ¼″ to 10″.

Cross

The word STREAMLINE is the Registered Trade Mark of the Mueller Brass Co., Port Huron, Michigan

Write for Catalog F.

EHRET MAGNESIA MANUFACTURING CO.

Thermal Insulations—Packings—Durant Insulated Pipe

Valley Forge, Pa.

EHRET DISTRIBUTORS OR APPROVED CONTRACTORS IN ALL PRINCIPAL CITIES

Ehret's 85% Magnesia is the standard material for insulating pipes and metal surfaces whose temperatures do not exceed 600° F. It is light, strong, highly efficient and lasts indefinitely. Available in a full range of sizes and thicknesses, in Pipe Covering and block forms, and in powdered form for use as a plastic cement.

Ehret's Enduro is the high-temperature companion to Ehret's 85% Magnesia. Made from precalcined diatomaceous earths, Ehret's Enduro is suitable for use on temperatures up to 2000° F., and is available in the same forms as 85% Magnesia. Multiple layer pipe coverings of the combination of these two materials are widely used.

Other Ehret Heat Insulations include materials such as air cell pipe coverings, Heat-Seal insulating wool blankets, asbestos blankets, spongefelt, Panel-Board, fill insulations, Durocel concrete, insulating and finishing cements.

Ehret's Refractory Cements include a full range of dry, plastic and castable materials for temperatures up to 3300° F.

Ehret's Heat-Seal Building Insulations are made of fine, light, strong mineral fibre that resists settling or disintegration. Made in granular form for blowing or pouring into enclosed spaces, in loose form for packing by hand, and in both unbacked and paper-backed batts of standard sizes.

Ehret Cold Insulations are made in a wide range of materials. Standard Hair Felt, Cork, Wool felt, Anti-sweat and Frost-proof coverings are some of the many forms of Ehret low temperature materials.

Ehret Packings are furnished in standard forms for practically every mechanical packing requirement. These Valley Forge packings are described in full in a special packing catalog.

For full details of the many Ehret products, see the Ehret Insulation Manual.

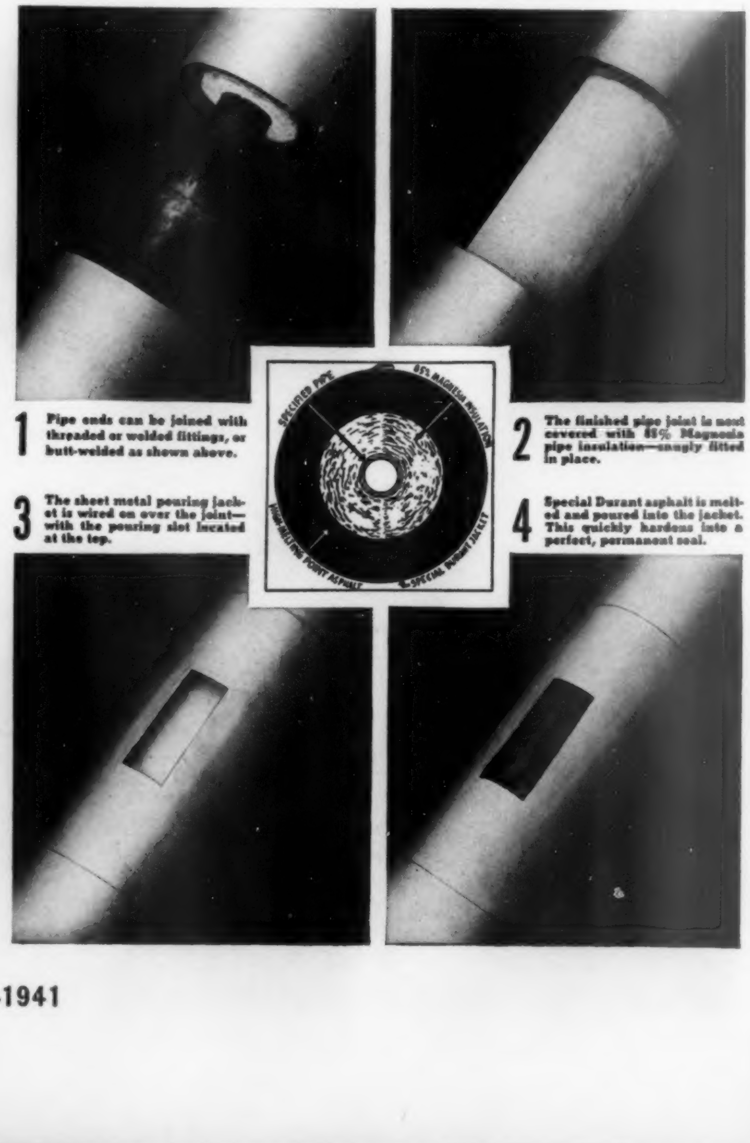
FOR DEPENDABLE, TROUBLE-FREE PROTECTION OF UNDERGROUND AND OUTDOOR PIPE-LINES SPECIFY EHRET'S . . .

DURANT INSULATED PIPE

This unique system of pipe-line protection consists of standard pipe that is insulated, sealed and protected **at our factory,** and shipped to the job ready for installation. The easy field-jointing method shown in the illustrations at the right can be followed by ordinary workmen, and the completely installed system can be practically forgotten, as far as maintenance or upkeep is concerned.

Ehret's Durant Insulated Pipe will not crack or leak, and moisture or water is permanently excluded by the time-defying layer of high-melting-point asphalt that encloses all parts of the system. No sub-drains, tile or concrete required and backfill can be made as soon as the pipe is installed. Trenches can be shallow without fear of damage by impact from trucks or other heavy vehicles.

Write for the special Ehret folder describing D. I. P. in full detail.



1 Pipe ends can be joined with threaded or welded fittings, or butt-welded as shown above.

2 The finished pipe joint is next covered with 85% Magnesia pipe insulation—snugly fitted in place.

3 The sheet metal pouring jacket is wired on over the joint—with the pouring slot located at the top.

4 Special Durant asphalt is melted and poured into the jacket. This quickly hardens into a perfect, permanent seal.

THE RIC-WIL COMPANY

Underground Conduit Systems for Heating and Power Pipes

Union Commerce Building, Cleveland, Ohio

AGENTS IN PRINCIPAL CITIES

REG. U. S. PAT. OFF.

Ric-wiL Interlocking Conduit and Base Drain Foundation, Tile and Cast Iron; Ric-wiL Insulated Pipe Units; "Dry-paC" Waterproof Asbestos Conduit Insulation; Roller Pipe Supports; Alignment Guides; Manhole Covers; Asphalt Impregnated Filter Tape.

Ric-wiL Interlocking Conduit

Ric-wiL Conduit is first quality, standard weight, vitrified glazed tile of the bell and spigot type.

It is shipped on the job in full round sections and split into top and bottom halves as used. Thickness of tile is reinforced to double strength at top and bottom. When installed, bell and special Loc-liP side joints are sealed with portland cement. Loc-liP joint (see illustrations) is shaped so that cement locks top and bottom halves permanently together in all directions, giving conduit extraordinary rigidity and strength. Leakage is practically impossible.

Top and bottom halves are interchangeable (foolproof) and numbered in pairs so that companion pieces may be kept together.

Sections are all in 2-ft. lengths, sizes from 4 to 27-in. inside diameter. Every sixth section of conduit has an opening in the bottom half through which a pipe support of the roller type projects to carry the steam, hot water or oil pipes, thus making the pipe supports independent of the conduit itself, a desirable feature for this class of work.

Ric-wiL Interlocking Base Drain Foundation

Ric-wiL Base Drain Foundation is first quality vitrified glazed tile, so designed that it is both a base for supporting and lining up the conduit and drain for carrying away water which might otherwise accumulate around the conduit. Top of base drain has slot into which the bell of conduit fits, making sections of conduit and base drain stagger with each other to form a strong interlocking construction. Pipe support saddles rest on the side shoulders, which insure perfect alignment of pipes. Wide flat bottom of base drain makes a solid foundation. Free drainage area of the base drain is large and ample for every practical condition. Made in three sizes to support properly all conduit sizes.

Cast Iron Ric-wiL Conduit

For extra heavy duty under railroads or where conduit is subject to very heavy loads, Ric-wiL is made of cast iron. Has Loc-liP Joint and "interlox" with tile Ric-wiL—made for all 5 types described in next column. A special heavy duty tile base drain or a cast iron base drain is provided for use with Ric-wiL Cast Iron Conduit.

Systems to Meet All Conditions

Type F System—For steam heating, power pipes and superheated steam. A conduit that assures super-efficiency when insulated with Dry-paC (description below), or Ric-wiL No. 11 Filler, packed around pipes in closed construction.

Type SPC System—For steam heating, power pipes and superheated steam. Insulation is any standard make of sectional pipe covering, kind and thickness depending upon service to be rendered. Double drainage is provided in this type.

Type DA System—For hot water, oil transmission and condensation returns. Tile and insulation in one, the latter, a diatomaceous earth mixture of high insulating quality, moulded inside the tile and keyed in. This type insulates the pipes from surrounding ground but not from each other, making it specially adapted to carry oil and steam pipes together for oil transmission. Exceptionally easy to install.

Type DF System—For steam heating, power pipes and superheated steam. This is Type DA with the addition of Ric-wiL Asbestos Conduit Filler to be packed around pipes at a density specified by manufacturer. Filler is a good non-conductor which will not corrode the pipes nor shrink. Dry-paC furnished when specified.

Super-Strength Tile Conduit—To support any average traffic load, or for use in extra wide or deep trenches. Details on request.

Dry-paC Waterproof Conduit Insulation

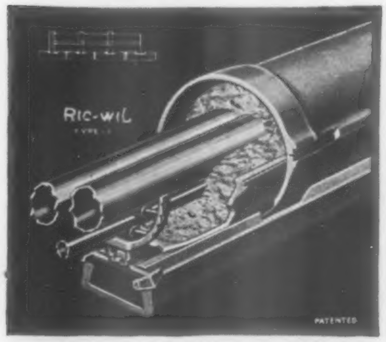
A high-grade long fibre asbestos insulation, processed so that it is permanently water repellent. Of unusually high efficiency and great natural strength, it will not slump down away from pipes and is non-corrosive. Sample will be sent gladly for testing.

Insulated Pipe Units

These pre-sealed factory-built Units come in standard lengths, for underground or outside overhead work. Complete with steam pipe, insulation and all accessories. Armco Hel-Cor Conduit used has heavy asphalt coating and protective wrapping to resist all deterioration. Choice of insulation including sectional pipe covering.

Engineering Service

Full co-operation with architects and engineers; complete service details and installation instructions; installation supervision where desired. Catalogs, test reports, typical specifications, etc., promptly on request.



Ask for Catalog 40 showing all Ric-wiL Systems

(ESTABLISHED 1857)

MUELLER COMPANY

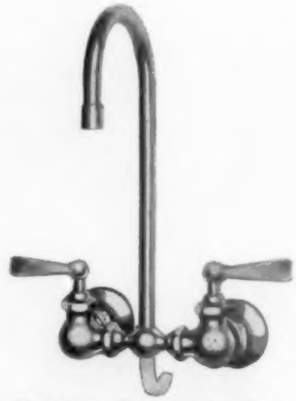
Decatur, Illinois

FACTORIES: Decatur, Illinois; Sarnia, Ont., Canada; Los Angeles, Calif.; Chattanooga, Tenn.
BRANCHES: New York; San Francisco

28 STAINLESS STEEL PINS *punch out* all lime, alkali and corrosion every time adjusting handle is turned

H-5425 Shower Head with self-cleaning device and adjustable ball joint

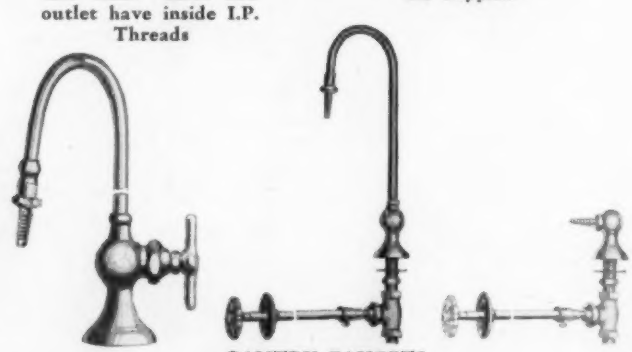
H-12080 Compression Swing Spout Faucet. Spout swings down into sink. Inlet and outlet have inside I.P. Threads



H-12085 Compression Double Swing Spout Faucet. Same as H-12080 except double supplies

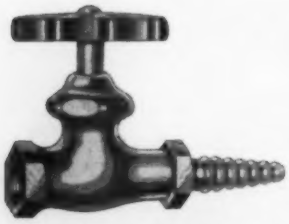
H-12015 Ground Key Laboratory Stop with tapered corrugation for hose. Flat lever handle. Inside I.P. Thread

H-12017 Ground Key Laboratory Stop with tapered corrugation for hose. Flat lever handle. Outside I.P. Thread

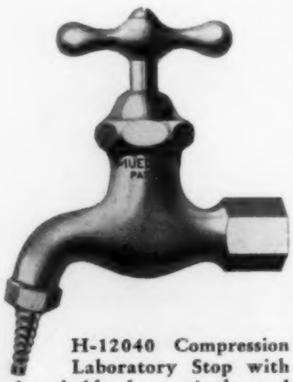


PANTRY FAUCETS

H-12090 Four Arm indexed (cold) Faucet regularly supplied
H-12092 Remote controlled with Wheel Handle
H-12093 Remote controlled with Wheel Handle and Turret Top. Can be furnished with one, two, three or four nipples in turret



H-12020 Compression Laboratory Stop. Wheel handle and detachable hose nipple. Inside I.P. Thread

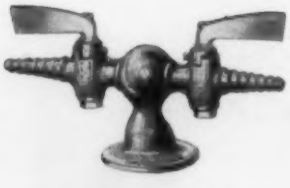


H-12040 Compression Laboratory Stop with detachable hose nipple and tee handle. Inside I.P. Threads

H-12125 "Y" Connection. ⅜" outside I.P. Thread inlet with ¼" inside I.P. Thread outlet

H-12130 "Y" Connection. Insde I.P. Thread inlet with outside I.P. Thread outlet

H-12145 Nipple with outside I.P. Thread inlet and tapered corrugation for hose outlet



H-12050 Pedestal Laboratory Stop. Pedestal inlet ⅜" or ½" inside I.P. Thread. Tapered corrugations for hose connections. Also furnished as one stop, three stop and four stop fittings

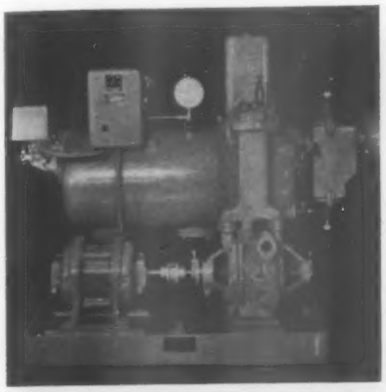
H-12183 Turret with one outlet. Can also be furnished for two, three, or four outlets

Send for a copy of Mueller Laboratory Brass Goods catalog. Fully illustrated with complete data as to sizes and finishes available

THE NASH ENGINEERING COMPANY

222 Wilson Road South Norwalk, Conn., U. S. A.

SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES



JENNINGS RETURN LINE VACUUM HEATING PUMPS

Standard with the heating industry for over sixteen years. Jennings Pumps remove air and condensation from the return lines of vacuum steam heating systems, discharging the air to atmosphere and returning the water to the boiler.

Two independent pumping units are combined in a single casing—an air unit which handles only air, and a water unit which handles only water. The capacity of each unit is simultaneous capacity. Each handles the full rated capacity independent of the other. Impellers of both are mounted on the same shaft. The pump is bronze fitted throughout.

Supplied either direct connected to standard electric motors, for belt drive, or for steam turbine drive. For continuous or automatic operation against pressures up to 40 lbs. Supplied standard in capacities up to 300,000 sq. ft. E.D.R. Bulletins on request.

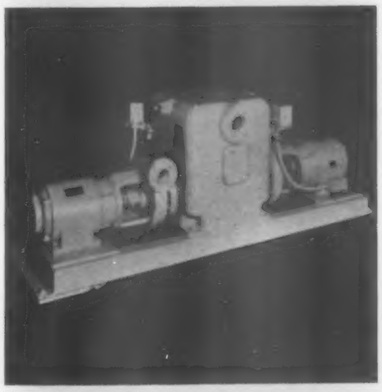
JENNINGS VAPOR TURBINE VACUUM HEATING PUMPS

The Jennings Vapor Turbine Heating Pump combines all of the advantages of the Standard Jennings Return Line Heating Pumps with a new type of drive, a specially designed low pressure turbine which operates directly on steam from the heating mains on any system, requiring a differential of only 5 in. of mercury, and returns that steam to the heating system with practically no heat loss.

This pump affords the economy which goes with a continuous condensation return and steady vacuum, and at no cost for electric current.

The Jennings Vapor Turbine is a safe heating pump, for it functions as long as there is steam in the system, entirely independent of electric current failure. Ideal for Greenhouse, School, and Hospital service.

Furnished standard in capacities up to 150,000 sq. ft. E.D.R. Bulletin on request.



JENNINGS CONDENSATION PUMPS

Jennings Condensation Pumps remove condensation from radiators in return line steam heating systems and pump condensation back to the boiler.

Jennings Condensation Pumps are sturdy and compact in construction, and combine receiving tank, pump and driving motor in a single assembly. Bronze fitted throughout, with Tobin bronze shaft. Impeller is of special design adapted to handling hot water with highest efficiency.

They efficiently remove condensation from radiators, particularly those set below the boiler water line level. Pump casing forms part of return tank, making a compact structure that conserves floor space. Rectangular construction permits installation in corner or against wall.

Jennings Condensation Pumps are furnished in standard sizes with capacities ranging from 1½ to 225 g.p.m. of water, for serving from 1,000 to 150,000 sq. ft. equivalent direct radiation. Bulletin on request.

JENNINGS SUMP AND SEWAGE PUMPS

The Jennings Suction Sump Pump is a self-priming centrifugal pump for handling seepage water and liquids reasonably free from solids. The Suction Sewage Pump is fitted with a non-clog type impeller. Pumps are mounted entirely above the sump where they are always readily accessible. Only the suction pipe is submerged.

There are two moving parts: the centrifugal impeller and the vacuum priming pump rotor. Both rotate without metal-to-metal contact in the casing. Both are mounted on the same shaft that carries the rotor of the electric driving motor, making a compact assembly.

These pumps may be installed away from the pit, or directly over the pit. The Pedestal Type Jennings sets directly on the pit cover, requiring no other foundation.

Capacities and heads to meet all requirements. Bulletins on request.

JOHN J. NESBITT, INC.

Manufacturers of

Heating, Ventilating and Air Conditioning Equipment

Holmesburg, Philadelphia, Pa.

11 Park Place, New York City

Today's Most Healthful Heating and Ventilating for the New or Remodeled School Building . . .

RESULT of years of scientific research and progress, the Nesbitt Syncretizer represents the most advanced thought on heating and ventilating the schoolroom. It brings in and distributes to the classroom a continuous supply of fresh, outdoor air, and syncretizes or harmonizes it with the room air so as to maintain a healthful, comfortable June-like condition, even when the outside temperature is below zero.

The Nesbitt Syncretizer

DRAFTLESS FRESH AIR WITHOUT OVERHEATING

Fully automatic, the Nesbitt Syncretizer prevents drafts, overheating and unpleasant odors. It is adjustable according to any State's laws to deliver all or part outdoor air, but always some outdoor air to occupied classrooms. Its special Air-Stream Minimum Temperature Control provides that all air taken from outdoors is first warmed to a safe minimum temperature, thus preventing drafts. The Room Temperature Control assures that the desired room temperature will be uniformly maintained without permitting overheating.

ENDURING BEAUTY — QUIET, ECONOMICAL PERFORMANCE

The Syncretizer's simple beauty is conformable to schoolroom needs; it is attractive but not obtrusive. Its velvety finish has restraint and long life. Tests have proved it to be the quietest of units. Its economy of fuel and current wins lasting favor.

A LEADER IN ITS FIELD

In competitive demonstrations before school boards, the Nesbitt Syncretizer has outsold all other unit ventilators, and is today the unit most frequently specified for new schools.

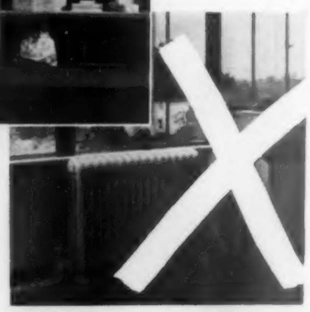
TRANSFORMING OLD SCHOOLROOMS

Recently Nesbitts have advanced the idea of rehabilitating old schools by a program of Nesbitt Modernization, suiting the particular needs of the individual school. Obsolete heating systems can be replaced or modernized. Nesbitt Syncretizers can be installed where units have never been used or to succeed old, outmoded ventilators. Earlier Nesbitt units can be modified by the installation of advanced mechanical features to give today's and tomorrow's better results. Savings of fuel and current often finance the improvement.

MODERN STREAMLINING

Neat, convenient storage shelves integrated with heating and ventilating units can bring a streamlined laboratory appearance to a cluttered classroom. Nesbitts now furnish their Syncretizers and auxiliary convectors in special casings when desired for combining pleasingly with standard or specially built storage units.

Do away with outmoded heating and ventilating equipment . . . get improved appearance, comfort and economy!



Factual data, including actual case histories of some of the thousands of old schools modernized by John J. Nesbitt, Inc., will be furnished upon request.

NESBITT Syncretized Air

PERPETUAL JUNE IN THE CLASSROOM

Nesbitt Syncretizers are sold by American Blower Corporation, and John J. Nesbitt, Inc. Complete information is contained in Publication No. 231. For engineering data, Publication No. 225.

PETROLEUM HEAT & POWER COMPANY

Main Office and Factory: Stamford, Conn.

Oil Burning Equipment—*"Since 1903"*—Fuel Oils

PETRO
Reg. U. S. Pat. Off.

INDUSTRIAL AND COMMERCIAL OIL BURNING SYSTEMS

"Cut Steam Costs for Schools and Universities"

Automatic boiler operation is the aim of cost-conscious management, but for various sound reasons, it may not be feasible in certain plants. Consequently, Petro burners are available for three general methods of operation:

AUTOMATIC—SEMI-AUTOMATIC—MANUAL

Petro's operating economies, proved every month in thousands of installations, are due to principles rather than "features" or gadgets. Experience-developed design for specific application, inherent simplicity, and traditionally fine manufacture are basic in Petro burners.

In automatic operation these are enhanced by two important factors in firing efficiency and fuel economy. These are:

(1) PETRO'S THERMAL-VISCOSITY CONTROL

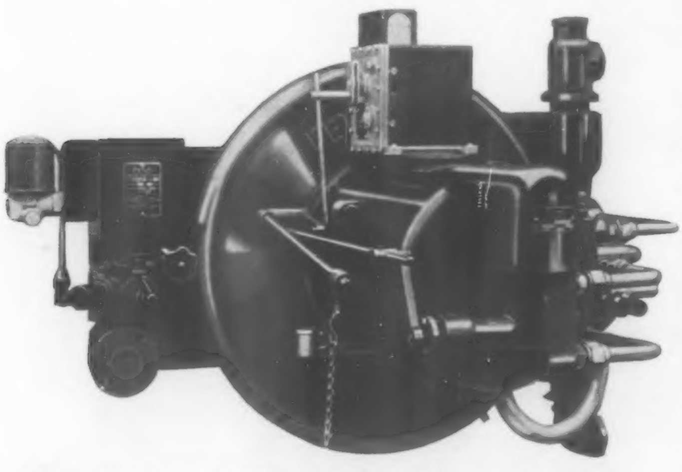
—a well proven system for burning No. 6 or Bunker "C" oil at maximum combustion efficiency under absolute control without any need for frequent manual adjustment—the only method of burning preheated oils which can be called "automatic" legitimately.

(2) MODULATED FUEL CONTROL

—a completely automatic control of high-low operation which permits automatic low fire starting and modulation or acceleration of firing to meet fluctuating steam demands:—maximum combustion efficiency at every stage of firing. Illustration shows modulating motor as mounted on burner (when specified) and arms and linkage through which constant fire-regulation is maintained.

SPECIFYING ENGINEERS will find it helpful to have complete information on these factors which so markedly affect operating costs. Petro Industrial Burner Catalogue may be found in "Sweets," or copy will be sent gladly on request.

MODEL W-DIRECT DRIVEN, ROTARY CUP TYPE BURNERS



This Burner is a self-contained assembly of motor, fan, pump, rotary cup atomizer and all air and oil adjustment apparatus. Illustrated above is a Petro Model W for Automatic operation on No. 6 (Bunker "C") fuel oil. (Model W-9 requires separate pump set.)

Interlocking air and oil control mechanism permits any minimum or maximum operation required within the burner's range of operation. Counter-flow Angular Air Vanes at nozzle increase air and oil turbulence and aid efficient combustion of heavy fuel oils.

Special oil adjustment valve meters oil to rotary cup, yet permits manual operation without disturbing permanent burner adjustment.

CAPACITIES

Model	Motor H.P.	Max. Gals. Per Hour	Rated Capacity Boiler H.P.	Sq. Ft. C. I. Steam Radiation *
W-2½	⅓	11	34	4,800
W-3	½	15	47	6,540
W-4	½	25	78	10,825
W-5	1	33	103	14,300
W-6	2	45	141	19,600
W-7	2	62	195	27,150
W-8	3	100	313	43,500
W-9	3	145	454	68,000

W-2½ to W-9 burns No. 5 fuel oil of 300 seconds maximum viscosity at 100° F. Saybolt Universal or any lighter oils without preheating. When heavier No. 5 or No. 6 (Bunker C) fuel oil is used, preheating is required. Models W-2, 2½, 3 and 4 burners, single phase 110 or 220 volt, 50 or 60 cycle. Model W-5 single phase, 220 volt, 50 or 60 cycle.

All models, 220, 440, 550 volt, polyphase, 50 or 60 cycle.

W-2 to W-8 belt driven type is available in 25, 30, and 40 cycle A.C. for all standard voltages, single or polyphase; also 115-230 volt D.C.

(*) Equivalent Direct Cast Iron Steam Radiation measured at the boiler outlet.

Removable rotary cup and nozzle permits changing shape of flame to suit requirements of any boiler and prevent flame impingement.

Oil pump is a slow speed, permanently packed, self-priming, self-aligning, non-binding or clogging mechanism, assembled as an integral part of burner. Burners also available without integral pump. Motor is cooled by induced circulation of air. Armature shaft is mounted on two deep-groove annular ball bearings. Splash lubrication from the sump which is below the pump drive, lubricates all bearing surfaces in the burner.

OTHER PETRO OIL BURNING EQUIPMENT

Industrial: All generally accepted types of industrial fuel oil burners, for various special types of application and service, are included in the complete line of Petro Industrial Equipment.

Domestic: Oil burners for general application to installed domestic heating plants. Specially designed burners for specific makes and sizes of boilers or furnaces.

Automatic oil fired steel domestic heating boilers, up to 575 sq. ft. E.D.R. Steam.

Instantaneous Water Heaters burning No. 3 oil, capacity 120 gallons water per hour, 100 degree temp. rise.

High Pressure boilers up to 25 H.P. automatically oil fired.

Catalog on request.

B. F. STURTEVANT COMPANY

Heating, Ventilating, Air Conditioning and Vacuum Cleaning Equipment

MAIN OFFICE AND WORKS

Hyde Park, Boston, Mass.

SALES ENGINEERING OFFICES

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Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.

PLANTS LOCATED AT

Hyde Park, Boston, Mass. Sturtevant, Wis. Framingham, Mass. Camden, N. J. Berkeley, Calif. Galt, Ont.

B. F. Sturtevant Company of Canada, Ltd., Galt, Ont.: Sales Offices in Toronto and Montreal, and representatives in principal Canadian Cities

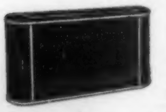
Representative: **A. M. Lockett & Co., Ltd.**—New Orleans, La., Houston, Tex., Galveston, Tex., and Dallas, Tex.

Mexican Representative: **E. N. MacKINNEY,** Ingeniero, Gante 8, Suite 42, Mexico, D. F.

The Cooling and Air Conditioning Division of B. F. Sturtevant Company, Hyde Park, Boston., Mass.

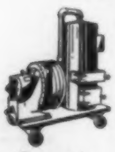
Atlanta, Ga.; Camden, N. J.; Chicago, Ill.; Greensboro, N. C.; Los Angeles, Calif.; New York, N. Y.

UNIT VENTILATOR

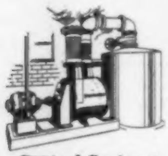


A combined steam heating and ventilating unit widely used in schools and other places. Finished in duco of any standard color. Stainless steel trim.

VACUUM CLEANERS



Portable



Central Systems

Sturtevant Vacuum Cleaners are made in both portable and stationary Central System types and in a variety of sizes to meet every school building need.

Features: Quiet operating vacuum producers, high suction for rapid cleaning under all conditions; tools designed individually for specific cleaning operations. Central Systems include piping recommendations to insure correct operation of the system.

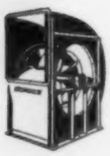
SILENTVANE FAN

Backwardly curved blade type. A ventilating fan to meet the most exacting specifications, where very high efficiency and exceptionally low power consumption are required.

MULTIVANE FAN

Forwardly curved blade type. A highly efficient centrifugal ventilating fan of sturdy construction to meet the general run of ventilating requirements.

REXVANE FAN



The modern paddle wheel. Correct inlet blade curvature and stream line shrouding retain all good features of the old paddle wheel and greatly increase capacity.

Sturtevant

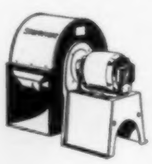
REG. U. S. PAT. OFF.

Puts Air to Work

CONVERTIBLE MULTIVANE FAN

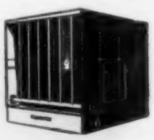
This is a low speed centrifugal type fan with convertible and reversible housing, permitting quick conversion to any horizontal or vertical discharge.

VENTILATING SET



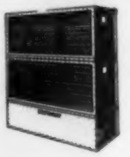
Direct connected; motor driven. For use with ducts, in ventilating small rooms, laboratory hoods and, in general, any room up to 10,000 cu. ft. contents.

AIR WASHER



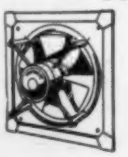
Built in several types to meet varying requirements in cleaning, cooling, dehumidifying and humidifying air.

FILTICOOLER



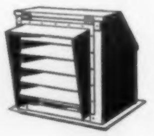
A compact, highly efficient, sectional type air washer. For filtering, washing, humidifying, cooling, and dehumidifying. Available in a range of sizes.

PROPELLER FAN



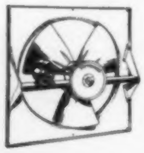
Built in fan sizes from 12 up to 45 in. Electric motors are available for both alternating and direct current, in wide variety of voltages.

PENT HOUSE



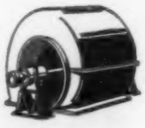
Sheet steel construction, with angle-iron framework. Includes automatic shutter and rain guard. Made in range of sizes for Sturtevant Propeller Fans.

ATTIC FAN



A propeller type fan for installation in the attic, for cooling and ventilating. Range of sizes. Motors for various voltages, for a-c. and d-c.

MECHANICAL DRAFT FANS

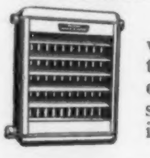


Forced and induced draft fans to meet any need. Can be furnished with Sturtevant reduction gears and steam turbine, motor or engine drive.

PRESSURE BLOWER

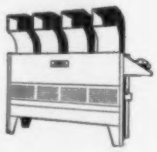
A small, compact forced draft fan, with direct connected electric motor, for coal burning heaters in schools and other buildings.

SUSPENDED "SPEED HEATER"



Propeller fan type, for wall or ceiling installation. Fin type heating element. For steam pressures up to 200 lbs., capacities up to 300,000 B.t.u.

REXVANE SPEED HEATERS



Centrifugal fan type for floor, wall, or ceiling installation. Fin type heating element. For steam pressures up to 200 lbs., capacities up to 1,421,000 B.t.u.

WARREN WEBSTER & COMPANY

—since 1888 Webster Systems of Steam Heating

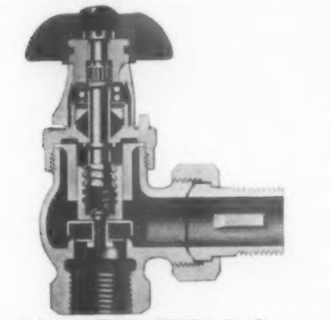
Pioneers of Vacuum Steam Heating

HOME OFFICE and FACTORY—Camden, N. J.

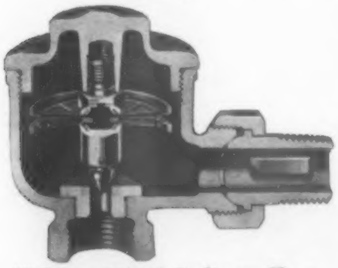
REPRESENTATIVES IN 60 PRINCIPAL U. S. CITIES

CONSULT YOUR TELEPHONE BOOK OR WRITE CAMDEN, N. J.

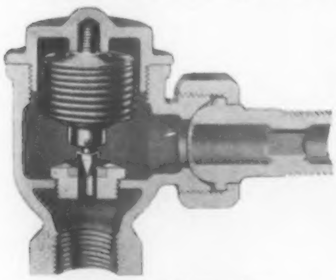
STEAM Heats America . . . . ©1940



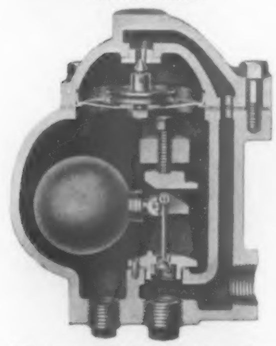
Webster Type "WB" Radiator Valve



Webster 702-M Radiator Trap



Webster Sylphon Trap Attachment



Webster 0026T Drip Trap

A substantial percentage of the 80,000 odd installations of Webster Systems of Steam Heating has been made in schools and colleges. This fine record is due to correct application of high quality Webster Equipment resulting in great dependability and low maintenance cost. Webster System Equipment includes:

RADIATOR SUPPLY VALVES—Manually operated, opening quickly in less than a turn of the handle. Provide positive steam shut-off. **Type "WB" Valve** uses molded ring packing and a spring-retained metal-to-metal seal. **Sylphon Packless Valve** uses a genuine seamless Sylphon metal bellows to completely encase valve stem.

RADIATOR TRAPS—Automatically discharge condensate and air without leakage of steam. Operate efficiently **at all pressures** within their range. **Series 5** uses genuine Sylphon bellows, **Series 7** a double metal diaphragm as thermostatic element.

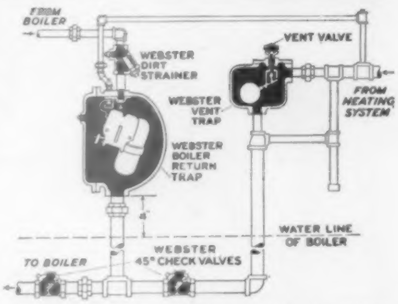
SYLPHON TRAP ATTACHMENTS give old Webster Traps and traps of other make modern high efficiency. Existing pipe connections not disturbed as original trap body is re-used.

DRIP TRAPS—Float-and-thermostatic or float types. For steam mains, blast ventilation, unit heaters, hot water generators, etc.

TYPE "R" SYSTEM COMBINATION—Webster Boiler Return Trap automatically returns condensate to boiler. Webster Vent Trap eliminates air. Webster Boiler Protector supplies make-up water when water line drops below danger level.

WEBSTER SYSTEM RADIATION consists of metal enclosures containing non-ferrous heating elements of high efficiency with integral Webster Supply Valve and Return Trap. Enclosures can be concealed in walls or exposed in room. Heating effect is by convection.

WEBSTER-NESBITT UNIT HEATERS—Series F for vestibules, halls, cafeterias, offices, etc. Other types for gymnasiums, garages, armories, and other large high-ceiling spaces.



Conventional arrangement of piping around Webster Basement Equipment for the Webster Type "R" System. Units are made to provide five sizes up to 16,000 sq. ft. of direct radiation

Webster System Radiation gives high heat output per unit of space occupied. Heating element removable without damage to building structure

Webster-Nesbitt Series F are attractive, efficient unit heaters for halls, vestibules, cafeterias, etc. Four other types available for varied space heating demands

CENTRAL CONTROLS—Heat **where** you want it, **when** you want it—this is the accomplishment of modern Webster Systems with Webster Central Controls. **Webster Moderator System** provides "control-by-the-weather" with an automatic Outdoor Thermostat. One or more Variators, hand operated, can be used to modify Outdoor Thermostat for quick heating-up, occupancy changes, heat shut-off. **Webster Hylo Controls** are provided for small buildings. Continuous heat with manual adjustment for changes in outdoor temperature.

Webster Systems can be used with boiler plants burning coal, coke, oil, gas or other fuels. Or they may take steam from a "city main." Return mains may be under vacuum or open to atmosphere as with the Webster Type R System.

THE CHICAGO HARDWARE FOUNDRY CO.

DEPENDABLE SINCE 1897

PRODUCERS OF HIGH GRADE IRON, NI-RESIST, SEMI-STEEL, BRASS, BRONZE, ALUMINUM AND ALLOY CASTINGS—MACHINE WORK—PLATING—PORCELAIN ENAMELING "SANI" FOOD AND DRINK EQUIPMENT —"SANI DRI" ELECTRIC HAND AND HAIR DRIERS—CAST IRON WELDING RODS

Sani-Dri-Division — North Chicago, Illinois — 41 American Bldg.

SANI-DRI for HAIR DRYING

MODELS TO MEET ALL REQUIREMENTS

SANI-DRI hair-driers dry *quickly* and *thoroughly* right down to the scalp. They facilitate the speedy clearance of dressing rooms and thus aid in the maintenance of class schedules. Schools with swimming pools report that SANI-DRI electrical hair-driers greatly reduce the number of colds due to "swim-wet" hair, aiding student health and promoting regular class attendance. All working parts of SANI-DRI are completely encased—it is therefore absolutely safe for users. **All air is drawn through a screen protecting against hair being drawn into motor or fan.** There are models of SANI-DRI to meet every requirement.

Model "SF-W" SANI-DRI

This wall-mounted model, with a *permanent porcelain* finish, is equipped with push-button control and **a correctly timed automatic cut-off.** It has a full-turn swivel nozzle adjustable to any position for users of various heights. Completely encased working parts ensure absolute safety for users. Provides a superior, *quick* and *thorough* hair-drying service.

Model "SF-W" with push-button control and *automatic* cut-off

Model "SF-W" SANI-DRI (Crackle Finish)

This model possesses all the advantages of regular Model "SF-W" except it is equipped with a manually operated instead of automatic switch control and is finished in crackle at lower cost to meet lower budget requirements. It has a full-turn swivel nozzle adjustable to any position. Completely encased working parts provide absolute safety for users. Like all models of SANI-DRI this one also dries the hair *quickly* and *thoroughly,* right down to the scalp.

Model "SF-W" with crackle finish and *manually* operated switch

NEW Model "SR-H" SANI-DRI (Semi-recessed)

This *new* semi-recessed wall model provides distinct advantages over other driers. The solid cast-iron box recesses in any wall that finishes four inches or more in thickness. For occasional oiling or cleaning, all working parts are made quickly accessible by the simple removal of two screws at bottom of cover. All air is drawn through a screen located at bottom of cover; completely encased working parts provide absolute safety for users. This model, with permanent porcelain finish, is smartly styled, has a manually operated switch and is equipped with the standard SANI-DRI full-turn swivel nozzle, adjustable to any position. This model may be specified with automatic foot pedal operated switch, if desired.

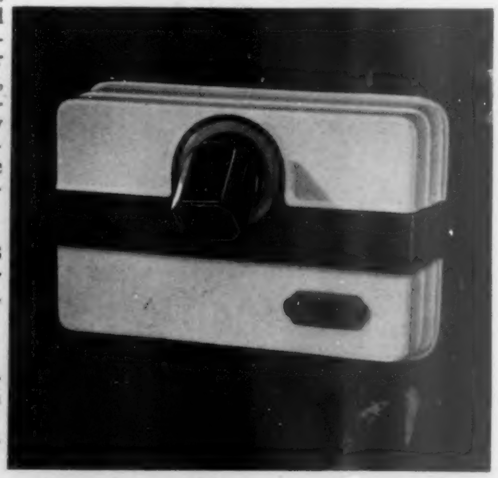
Model "SF-C" SANI-DRI (Coin-operated)

This penny-operated model is installed where desirable to make a small charge for hair-drying service. It also has a full-turn swivel nozzle and properly timed automatic cut-off. Completely encased working parts provide absolute safety to users. Permanent porcelain finish and the same high grade mechanism and convenience of other SANI-DRI models ensure long, satisfactory hair-drying service. This model is especially desirable for outside swimming pools and beaches where a minimum charge for hair-drying service is desirable.

Illustrated literature, prices and specifications for any or all models will gladly be sent upon request

Right: **Model "SR-H", semi-recessed. *Manually* operated switch**

Left: **Model "SF-C", coin-operated, *automatic* cut-off**



CRANE CO.

Valves, Fittings, Pipe, Plumbing, Heating, Pumps

General Offices: 836 South Michigan Avenue, Chicago, Illinois

NATION-WIDE SERVICE THROUGH BRANCHES, WHOLESALERS, PLUMBING AND HEATING CONTRACTORS

CRANE Plumbing and Heating for the Modern School

School boards, superintendents and architects will find Crane a dependable source of plumbing, heating and piping equipment to assure efficient, lasting sanitation and comfort for educational buildings.

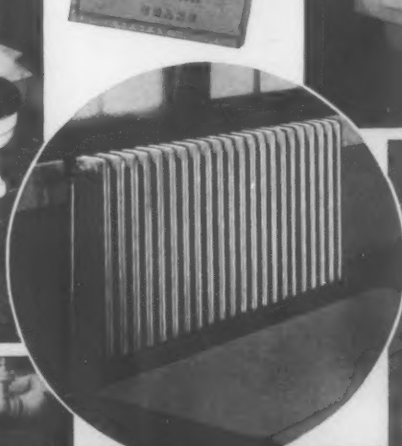
Crane serves school plumbing needs with a select line of fixtures and trimmings for every need. Their design gives special attention to prevention of contamination and spread of water-borne diseases. Their rugged construction in every part meets the severity of school service and protects against untimely replacements. Crane plumbing embodies many features of easy maintenance, user convenience, as well as of high adaptability to school requirements.

Uninterrupted and low-cost winter comfort is assured for schools with Crane heating systems. For each fuel and system, Crane offers boilers, radiators and essential equipment in advanced design—engineered for maximum heat output and durable, trouble-free performance.

Limited budgets for new construction or remodeling are no obstacle to the enjoyment of Crane Equipment in your school. It is available in a wide price range, and may be purchased on a convenient budget payment basis. Your inquiry will bring complete information—without obligation.

THIS SCHOOL PLUMBING GUIDE SENT FREE!

Based on thorough study of school sanitation requirements and long experience with such problems, the Crane booklet, "The Importance of Sanitary Equipment in Schools" will help you choose the right equipment for every plumbing need. A representative selection of fixtures is illustrated. You'll find this booklet most useful; sent free on request.



THE HALSEY W. TAYLOR CO.

Manufacturers of Drinking Fountains and Coolers

Warren, Ohio

AGENTS IN PRINCIPAL CITIES

PRODUCTS

Halsey Taylor Drinking Fountains; Combination Cooler Drinking Fountains in Iced Water or Electric Types.

DISTINCTIVE FEATURES THAT APPEAL TO ARCHITECT AND SCHOOL AUTHORITIES ALIKE

It was during the first World War that Halsey Taylor Drinking Fountains were introduced. Today, they are still accepted among the country's foremost fountains, because of their modern design, their distinctive patented features that spell convenience and sanitation alike, and their wide variety of models from which to choose. That is why they are still a preferred specification of architects and builders, whether for schools or other public buildings; industrial plants, hospitals or churches.

AUTOMATIC STREAM CONTROL
TWO-STREAM PROJECTOR

You buy more than a mere fountain when you buy Halsey Taylor Drinking Fountains. You buy definite assurance of trouble-free service, positive health-safety, maximum convenience, built-in patented features exclusive with Halsey Taylor!

It is in school operation that a fountain finds its greatest use as a factor in hygiene. When pupils drink from Halsey Taylor Fountains day after day, it is this assurance of health-safety that more than pays for the care in selecting the right make of fountain—and that make usually is Halsey Taylor, practically a standard in school installations the country over. Their most valued features are:

1 — Practical Automatic Stream Control

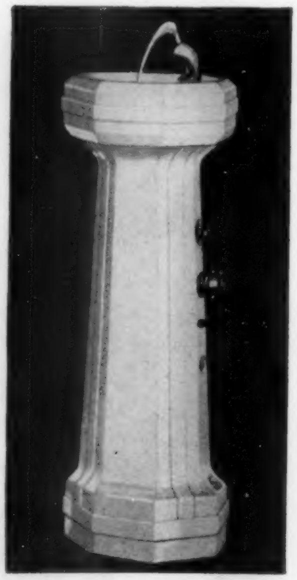
An automatic device maintains constant height in drinking stream regardless of line pressure variation. Stream never too high, never too low.

2 — Ideal Drinking Mound

The two-stream projector with latest type guard makes the side stream both practical and health-safe, removing objections found with ordinary side-streams.

3 — Definite Sanitation

Drinking mound is formed by the converging of two streams of water, setting up a localized drinking mound which makes it impractical to drink from any other point but the ideal height of the mound. Fingers or lips cannot come in contact with or contaminate water source. It is impossible to squirt the water.



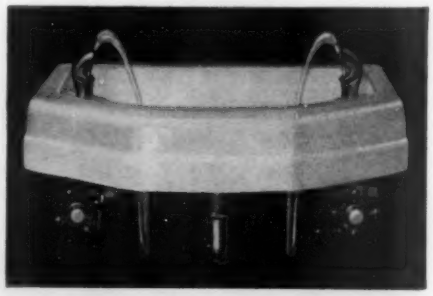
Pedestal Type—No. 3916

No. 3914

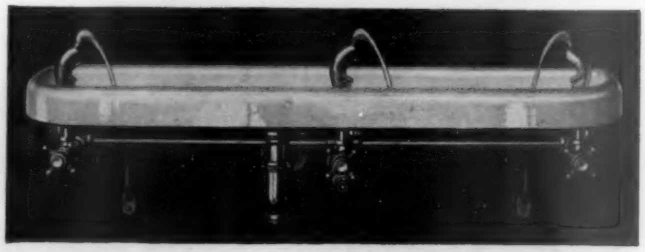
No. 3901

One of many attractive pedestal and wall types

Battery Types
Many two- and three-part battery types especially adapted to school installations



No. 3912



No. 2703

FOUNTAINS FOR EVERY REQUIREMENT

These pages show a few of the various types of Halsey Taylor Drinking Fountains. There are many models from which to select, all most modern in styling, all with the fundamental Taylor features. Send for catalog.

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES IN PRINCIPAL CITIES

GENERAL ELECTRIC AUTOMATIC LIGHT CONTROL

Assures Correct Schoolroom Lighting at All Times

An Automatic Thermostat Controls Your Heat — NOW You Can Have G-E Automatic Control for Your Light

In devising an inexpensive photoelectric lighting control unit for classrooms and study halls, the General Electric engineers have succeeded in solving a very vital school problem — the problem of minimizing eyestrain due to faulty lighting.

The application of the Photoelectric Relay to schoolroom light control is simple. A phototube, or "electric eye," is set up so that natural light from the windows falls on the tube. Variation in the amount of light striking the tube changes the current flowing in the tube. Amplified by a standard radio tube, this change operates a relay which in turn operates the lights.

Students' eyes protected by G-E automatic light control in typical school room

Adjustment of the control unit is both simple and permanent. Two knobs located on the control panel in the room fix the light level at which the unit will turn on the artificial light and the level at which the artificial light will be turned off.

Two Types

Two types of G-E Automatic Light Control are available—**flush**-mounted, and **surface**-mounted.

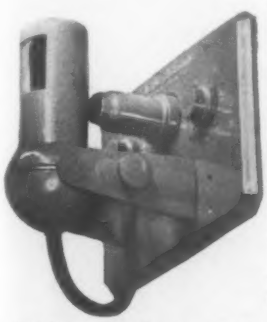
The **flush**-mounted model is best suited for installations in new buildings because it is to be installed on a three gang outlet box mounted in the wall.

The **surface**-mounted model can be used to advantage where it is not desirable to cut into the room walls.

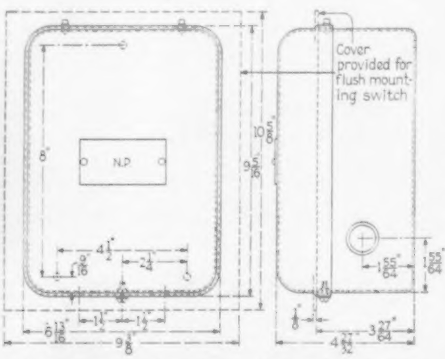
Connections to the lighting circuit of the building may be made at the regular wall switch.

Booklet

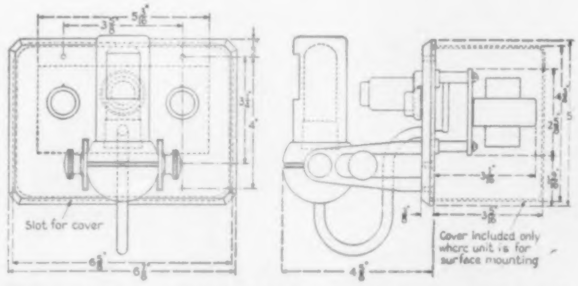
To those school executives or school architects interested in the details of G-E Automatic Light Control, we shall be glad to send a copy of our Booklet No. GEA-2606. Or a G-E representative will be glad to discuss classroom requirements with you, advising the proper type to meet your needs.



Wall-mounted room unit with light-sensitive phototube



Dimensions of remote relay and magnetic switch CR7500-P2A, for operating lights, flush- or surface-mounted



Dimensions of CR7505-D6A light sensitive control panel, flush- or surface-mounted

CORNING GLASS WORKS
MACBETH-EVANS DIVISION

Charleroi, Pennsylvania

718 Fifth Avenue
New York

Room 7-141
Merchandise Mart
Chicago, Ill.

SCHOOL LIGHTING LUMINAIRES

Corning Glass Works manufactures and sells glassware only. Complete fixtures of the type illustrated below, and using Corning glassware, are procurable through local jobbers and dealers.

SEMI-INDIRECT LIGHTING

We consider the semi-indirect lighting system using an enclosing globe to be highly practical for classroom illumination. Favorably low globe brightness (freedom from glare) is combined with the ease of maintenance feature of enclosed construction.

Corning offers semi-indirect enclosing globes made by a new process of manufacture (thermal opacification) which does not permit the globes to deteriorate in service.

Below are illustrated two patterns, "THE CAVALIER" and "THE ASTRON." Both meet lighting requirements of the school code "The American Recommended Practice of School Lighting."

"THE CAVALIER"

"THE ASTRON"

GALAX BRAND

(Semi-indirect)

"THE CAVALIER"

Available in a range of sizes

No.	Diam., In.	Depth, In.	Fitter, In.	Suggested Wattage
81663	14	9¾	6	200
81664	16	11	6	300
81665	18	12¾	6	500

"THE ASTRON"

Available in a range of sizes

No.	Diam., In.	Depth, In.	Fitter, In.	Suggested Wattage
81381	14	8⅞	6	200
81382	16	10 1/16	6	300
81383	18	11⅜	6	500

Hangers illustrated furnished through courtesy of The Art Metal Company, Cleveland, Ohio.

To specify use name and number.

IES Specification tests available upon request.

GENERAL DIFFUSE LIGHTING

The general diffuse enclosing globe system is the most economical method of classroom illumination. Use of a large size globe assures that the brightness will not exceed the limits suggested in the school code "The American Recommended Practice of School Lighting."

MONAX glass has long been recognized for its low light absorption and high diffusion. Thousands of MONAX globes are giving satisfactory service in schools throughout the country.

Below are illustrated two of the more popular patterns. Both are available in a full range of sizes.

"THE ORION"

MONAX GLASS

"THE ORION"

Using suggested wattage the surface brightnesses of "THE ORION" will be within the limits suggested in "The American Recommended Practice of School Lighting."

No.	Diam., In.	Depth, In.	Fitter, In.	Suggested Wattage
81391	9⅜	6½	4	75
81392	12⅜	8⅝	6	100
81393	14⅜	9⅞	6	150
81394	16⅜	11⅞	6	200
81395	18⅜	13⅛	6	300

"THE SEVILLE"

Available in a range of sizes

No.	Diam., In.	Depth, In.	Fitter, In.	Suggested Wattage
81119	8½	5 9/16	4	100
81316	10	6½	4	100
81317	12	7¾	6	150
81319	14	9	6	200
81320	16	10¼	6	300
81322	18	11⅜	6	500
81323	20	12¾	8	750

MONAX EXIT CUBE

We highly recommend the Exit Cube illustrated above for use in schools. The design is applied to three sides of this white glass cube, having a red background with white letters 5″ high. The bottom of the cube is not decorated, hence a flood of light is directed downward to the doorstep as an added safety feature.

The sides of this cube are 6″ square and it has a standard 3¼″ fitter. Specify or order by No. 81015 Design 44.

"THE SEVILLE"

CORNING GLASS WORKS — MACBETH-EVANS DIVISION CHARLEROI, PENNSYLVANIA

HOLOPHANE COMPANY, INC.

WORKS—Newark, Ohio | 342 Madison Ave. New York City | CANADIAN OFFICE: Toronto

PLANNED LIGHTING *for Every School Need . . .*

Modern Auditorium Lighting

Ideal Gymnasium Lighting

Special Lighting Service Arcade

In-Bilt Classroom Lighting

For every area in the school—for every activity on the school program, indoors and out—there is a Holophane unit specifically designed and constructed to provide the most adaptable illumination for the purpose.

Holophane lighting is not only effective and efficient, it is economical in every respect. For a given investment in current and lamps, each Holophane specific can be depended on to produce the greatest amount of useful light.

The cost of operation and maintenance is low with Holophane because there is absolutely no permanent depreciation of the prismatic glass light controlling surface. Temporary depreciation is kept at a minimum because the glassware is easily cleaned. All mechanical and fixture parts are of the best material and construction.

It will pay school authorities to investigate the **Efficiency, Permanence,** and **Economy** of Holophane planned lighting.

HOLOPHANE
PLANNED LIGHTING
PRODUCES THE GREATEST AMOUNT OF USEFUL LIGHT

PITTSBURGH CORNING CORPORATION

Grant Building, Pittsburgh, Pa.

PC GLASS BLOCKS

For better light, privacy, quieter rooms, lower heating and maintenance costs in schools

In schools and colleges throughout the country PC Glass Blocks have proved their value in scores of different ways. They are outstanding in practical, utilitarian advantages, as well as being modern and good looking

Advantages of PC Glass Block construction for school and college buildings

BETTER LIGHTING WITH PRIVACY

PC Glass Block panels bring generous amounts of well-diffused daylight into school and college buildings. They fit in admirably with the present trend toward more extensive light areas in schools, where good daylighting is especially vital for the protection of students' eyesight. Skilful use of PC Glass Blocks also results, usually, in substantial savings in artificial lighting costs.

With their fine light transmission properties, PC Glass Blocks combine the advantage of non-transparency. By the use of PC Glass Blocks, rooms can now be well lighted, yet the students cannot be disturbed by outside distractions. PC Glass Blocks are equally valuable in screening school activities from prying eyes from outside. And these blocks effectively insulate against outside sounds too.

BETTER INSULATION . . . LOWER HEATING COSTS

PC Glass Blocks provide twice the insulation value of ordinary single glazed window sash. Their insulation value is approximately that of a solid masonry wall. This property of PC Blocks usually results in definite savings both in original and operating costs of school heating equipment.

LOWER MAINTENANCE COSTS

PC Glass Blocks cut necessary maintenance on light areas considerably. They are easy to clean, and require cleaning less frequently than ordinary windows. Having no sash to rot or corrode, they eliminate entirely the usual maintenance item of repairing or replacing window sash.

Gymnasium in the Arnold's Park School, Arnold's Park, Iowa, where PC Glass Blocks were used by Architect Orrin Thomas

WHERE TO USE PC GLASS BLOCKS

In school and college buildings throughout the country, PC Glass Block construction has been used with outstanding success for the following purposes:

In classrooms, libraries, lecture and study halls to aid student concentration and promote eye-comfort by better lighting. In stairwells, to make staircases better lighted and safer. In corridors, to furnish borrowed light from classrooms. In gymnasiums, swimming pools, locker rooms and laboratories, where privacy combined with good lighting is imperative. And in any place at all where clean, good looking light areas improve a building's appearance.

There is a pattern, size and type of PC Glass Block to meet practically every requirement, including blocks designed to meet special light-directing and light-diffusing needs. PC Glass Blocks are manufactured by Pittsburgh Corning Corporation, and distributed by Pittsburgh Plate Glass Company and by W. P. Fuller & Co. on the Pacific Coast. For further information about PC Glass Blocks, write Pittsburgh Corning Corporation, 2215 Grant Bldg., Pittsburgh, Pa.

PC Glass Blocks provide plenty of daylight to make this stairwell safe. Hillman School, Youngstown, Ohio. Architect — Otto J. Kling

THE F. W. WAKEFIELD BRASS COMPANY

1941 Yearwood Park, Vermilion, Ohio

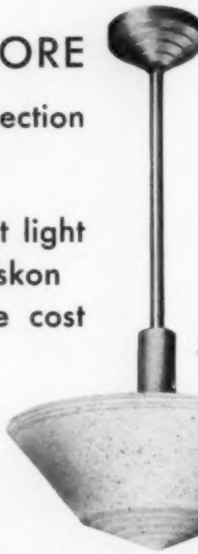
Over Thirty Years a Manufacturer of Lighting Equipment

DISTRIBUTORS IN 108 CITIES

The COMMODORE

. . for eyesight protection and Better Light

- **Glareless, indirect light**
- **Molded from Plaskon**
- **Low maintenance cost**



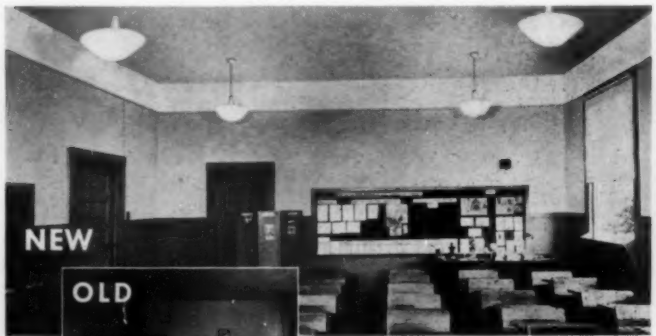
Also comes with "Star" shade

SCIENTIFICALLY designed to give the right light for easy seeing and eyesight protection, the Wakefield COMMODORE makes any schoolroom, **old or new,** more cheerful and more effective. With its simple, light-weight shade, molded from Plaskon, the COMMODORE also brings users these important advantages: 1. Unusually efficient indirect light; 2. Easy Cleaning; 3. High degree of safety; 4. Far less breakage; 5. Low maintenance cost; 6. Smart, modern appearance.

ONE PICTURE SHOWS *Before* and *After*
Seldom do you see in one unretouched photograph such a striking comparison of lighting results "before" and "after". Taken from outdoors, it shows at a glance how the COMMODORE improves seeing conditions. Upper room in this Ashland, Ohio, school lighted with old units; lower room with COMMODORES

MODERNIZES SCHOOLROOMS OVERNIGHT

Many a school with a tight budget has taken this practical way to begin having the benefits of better light; has installed COMMODORES in its worst lighted room to make it the best lighted . . . relighting other rooms year by year as funds become available.



When Wakefield COMMODORES went into this classroom in Birmingham, Ala., it made a BIG difference to the eyes of pupils who had to sit in the "inner row" . . . because the room formerly had no lighting units!

WHY THE COMMODORE HELPS GUARD SIGHT

According to Electrical Testing Laboratories, famous New York research and testing organization: The COMMODORE gives 86% of the light from the bare bulb. That means **more** light than most indirect fixtures . . . and it is soft, generous, diffused light . . . even the Plaskon shade is low in brightness . . . to make seeing easier, put far less strain on young eyes. For best results, light colored ceilings are necessary.

COMMODORES give pleasing, cheery light in the library and study room of the Lodi, Cal., high school

Thus classrooms which used to seem shabby and old-fashioned now look like new. Better light plus the COMMODORE'S simple, modern design, with attractive white shade and brushed aluminum shaft make a world of difference in the appearance of a room **and in the attitude of the people in it!** Attentiveness and morale definitely improved, say users, in classrooms lighted by COMMODORES.

WRITE FOR THIS INTERESTING BOOKLET

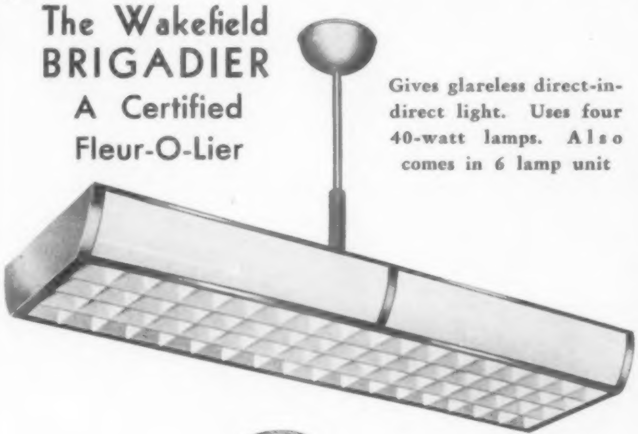
Filled with case histories from schools all over the country, this booklet brings you the benefit of other schools' experiences with better light . . . offers tested suggestions on how to have it . . . outlines factors to watch in addition to lighting and pictures the results obtained. This booklet provides information which will be genuinely helpful to school superintendents and school business officials. Write for your copy.

What about FLUORESCENT LIGHTING in schools?

You've probably heard something about fluorescent lighting, because it is so new, so different, so effective. Overnight, stores, offices and factories have taken it up . . . because fluorescent lighting provides much more light . . . cooler light . . . with low brightness . . . to help eyes see better, faster, with less strain.

Result: Many a school official is now wondering about fluorescent lighting, asking questions. Yet since the first cost is relatively high . . . although operation cost is low . . . most schools are thinking in terms of special applications where critical seeing tasks involved call for more light to guard eyesight. To meet general school needs, we suggest:

The Wakefield BRIGADIER A Certified Fleur-O-Lier



Gives glareless direct-indirect light. Uses four 40-watt lamps. Also comes in 6 lamp unit

The Wakefield BEACON A Certified Fleur-O-Lier

A very efficient diffusing fixture with tubes shielded. Uses four 40-watt lamps

WHY THEY GIVE "FLUORESCENT AT ITS BEST"

Wakefield fluorescent lighting fixtures have been engineered to use the new fluorescent lamps efficiently . . . to provide generous, glareless light that helps make seeing easier, guards eyes from strain. In the units above, the tubes are carefully shielded and enough light goes to the ceiling to give smooth, overall, shadowless light. Wakefield fixtures meet over 50 specifications for good light . . . for balanced performance . . . for safety and satisfactory service, **by test** of impartial Electrical Testing Laboratories. In short, they provide fluorescent lighting at its best.

SEE WHAT HAPPENED AT WATERLOO (IA.)

These pictures and captions show how Wakefield Fleur-O-Liers improved seeing conditions in several classrooms in two Waterloo, Iowa schools.

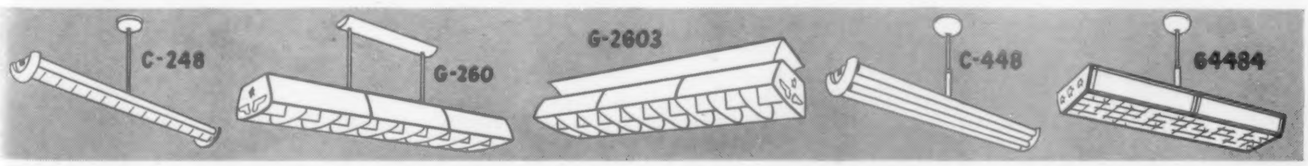
Light doubled in this 6th grade classroom, Kingsley School, Waterloo, Iowa, when Wakefield Brigadiers were installed. Wattage remained the same

Sewing room, West High School, Waterloo. The low contrast usually desired between cloth and thread make good light vital. Here, using existing outlets, Wakefield Fleur-O-Liers increased lighting levels 300% . . . to help protect young eyes from strain and make classwork easier

More even lighting and at least three times the amount of light resulted when Wakefield Fluorescent lighting fixtures replaced former units in the Library, West High School, Waterloo, Iowa

WRITE FOR FULL DETAILS

Wakefield makes a variety of fluorescent lighting units suitable for other specialized school applications, as the sketches below indicate. Write for new bulletins giving complete information about Wakefield fluorescent lighting fixtures, typical tested layouts for classroom lighting, and details of a new plan by which you can find out for yourself the facts about fluorescent lighting. They will be sent promptly on request.



WESTINGHOUSE ELECTRIC & MFG. CO.

Edgewater Park **LIGHTING DIVISION** Cleveland, Ohio

Westinghouse provides a complete line of fluorescent and incandescent luminaires for lighting class rooms, study halls, auditoriums, lecture halls, corridors and stairways, cafeterias, libraries, laboratories, rest rooms and offices. This lighting equipment includes direct, semi-direct, luminous-indirect and totally-indirect luminaires.

Because quality of light is as important as quantity, Westinghouse engineers have designed these lighting units to provide adequate, well-diffused illumination free from glare. They blend with any school architectural interior and are easily maintained.

Westinghouse offers, without obligation, a layout and engineering service to help you plan your illumination system. Descriptive information, including specifications and installation data, is available. Call your nearest Westinghouse distributor or write Westinghouse Electric & Manufacturing Co., Lighting Division, Edgewater Park, Cleveland, Ohio.

Interior Lighting Equipment

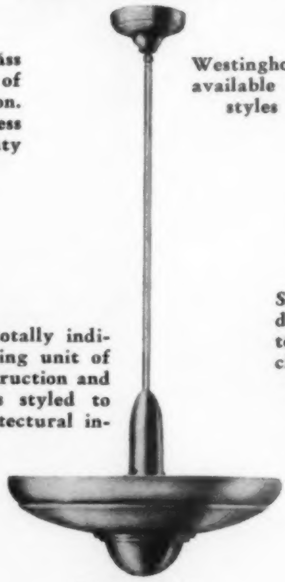
***Magnalux*, with Hi-Flec Glass Basin, sets a new standard of modern indirect illumination. Magnalux combines glareless lighting efficiency with beauty of design**

Westinghouse Luminaires are available in a variety of basin styles and hanger types

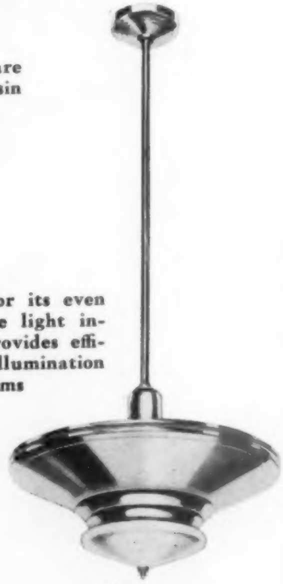
***TI Luminaire* is a totally indirect aluminum lighting unit of modern design, construction and performance. TI is styled to blend with all architectural interiors**

***Silvurn* is notable for its even diffusion of adequate light intensities. Silvurn provides efficient, economical illumination for class rooms**

Magnalux



TI Luminaire

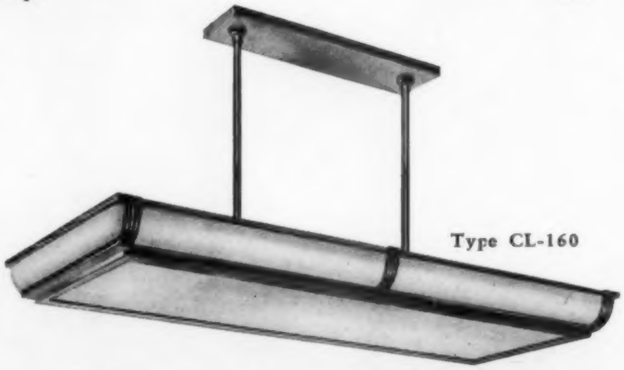


Silvurn

The *MB Luminaire* is a totally indirect fixture specifically designed for Bipost incandescent lamps

***Sollite* is a luminous direct lighting unit meeting the specifications of governmental agencies**

MB Luminaire



Type CL-160

***CL-160 Fluorescent Luminaires* combine the ultimate in modern design with high efficiency, quality illumination. Westinghouse provides a complete line of fluorescent fixtures for every school lighting need**

Sollite

GRAYBAR ELECTRIC COMPANY

Executive Offices: Graybar Building, Lexington Ave. and 43rd Street
New York, N. Y.

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SPECIALIZED ELECTRICAL-SUPPLY SERVICE

The Graybar Electric Company is a nationwide supply source for "everything electrical." It offers products from more than 200 of the nation's leading manufacturers. Prompt service of an individual type, closely attuned to local needs, is made possible by a network of 86 local distributing points and offices.

Because its experience is national in scope and extends back for 72 years to the very beginnings of the electrical industry, Graybar can provide an unusual type of service to buyers of electrical equipment in specialized fields . . . such as schools and colleges. Experienced representatives and field specialists know the kind of products that other schools in other communities have found most satisfactory. They know the special conditions that must be met in equipping or wiring school buildings.

When you put your needs for electrical equipment and supplies up to Graybar, you get the advantage of having a single, responsible source for equipment that "goes together" in use. This increases the value of the satisfaction-insurance which Graybar pledges on every product bearing the Graybar Tag.

COMMUNICATION, SIGNALING

Graybar Inter-Phones meet every requirement for modern interior telephone communication. On one popular model, connection to the called party is made simply by pushing a button in the base. Transmission is clear and dependable, and installation and maintenance costs are moderate. Graybar specialists will plan an installation to fit your needs.

Webster Teletalk Systems, also available through Graybar, provide the modern "amplified" type of interior communication. A wide range of units furnish individual communication, or "group" transmission, as required, for 2 to 24 stations or more.

Other Graybar specialties include Edwards "Lokator" paging systems, Edwards and Schwarze Fire Alarm Systems. A full line of accessories, including bells, buzzers, wiring devices, for all types of signaling and alarm requirements are also supplied.

LIGHTING AND LAMPS

Graybar is one of the nation's first-rank suppliers in the field of commercial and institutional lighting. From the Graybar Lighting Specialist, architects and school boards obtain broad-gaged information on a wide range of fixtures for lighting new buildings or for modernization.

For sight-saving indirect lighting, the smart-looking and highly efficient line of Silvray Luminaires, designed to use silvered bowl lamps, find unusually wide application in school classrooms and other locations where good seeing is essential. Economical new fluorescent lighting is also available "via Graybar." Graybar Lighting Specialists are prepared to lay-out all types of outdoor lighting installations for athletic fields, etc.

When you order lamps from Graybar, you get General Electric Mazdas in the type you require.

WIRE, WIRING SUPPLIES

A full line of supplies for initial installation or for modernization and maintenance can always be obtained from Graybar. This includes wire, conduit, conduit fittings, switches, receptacles and other wiring devices, extension cords and cable, fuses, tape, altogether some 60,000 items, "everything electrical." If you are looking for electrical equipment of any kind with special features desirable in school-building installations, check with your local Graybar office or write direct to Graybar Electric Company, Graybar Building, New York, N. Y.

THE HOLTZER-CABOT ELECTRIC CO.

Pioneers in School Signaling Equipment

125 Amory Street, Boston, Massachusetts

BRANCHES IN ALL PRINCIPAL CITIES

SAFETY

Semi-Flush S-A Station

Fire Eye

Holtzer-Cabot

SCHOOL FIRE ALARM
and AUTOMATIC FIRE DETECTION SYSTEMS

Endorsed by leading Fire Prevention authorities throughout the nation

Holtzer-Cabot Fire protection is of several separate and distinct types.

(a) The 'Auxiliarized' type "SA" system, providing a distinctive code signal which is instantaneously and automatically transmitted to the city fire headquarters . . . and to sounding devices within the building as a signal to vacate the premises. Fire Drill signals may be sounded within the building without alarming the fire department. It also provides for constant electrical supervision of all wiring and equipment, automatically warning of any derangement by both audible and visual signals.

(b) Automatic "Fire Eyes," which immediately detects an incipient fire and initiates an alarm. They maintain a continuous watch over protected areas when no one is near. They are on duty 24 hours a day, vigilantly safeguarding against slow smouldering fires by their "Fixed Temperature" feature, or a sudden rise of 10° F. per minute by their "Rate of Rise" feature. Fire Eyes may be connected to automatically sound a standard coded alarm on the bells of the "SA" or similar coded system and at the same time, transmit an alarm to City Fire Headquarters. School fires are an ever-present threat to life and property. Let Holtzer-Cabot engineers show you how to guard against them. Write for descriptive literature today.

PUNCTUALITY

Holtzer-Cabot

ELECTRIC CLOCK
SYSTEMS

Punctuality is the first requisite in the timing of all school activities. Holtzer-Cabot Clock Systems are both accurate and dependable because every part is precision-engineered in Holtzer-Cabot's own factory, hence punctuality is assured at all times. Holtzer-Cabot Electric Clock Systems not only provide split-second accuracy in time-keeping . . . they perform many other essential functions in the classroom. By means of a Holtzer-Cabot "SCHEDULE MASTER" Automatic Program Machine, for instance, the entire program is automatically released minute-by-minute, day-by-day for the entire week. Holtzer-Cabot Clock Systems can also be utilized to provide intercommunicating telephone systems, ring bells, buzzers, yard gongs, etc.

Holtzer-Cabot Clocks, Bells and Buzzers are furnished in various types and sizes to meet the individual requirements of every school. Holtzer-Cabot engineers thoroughly experienced in School Signaling Systems, are at your service. They will be glad to confer with you, without obligation, on any phase of Signaling Systems. Complete specifications, wiring diagrams and data covering the system desired for any particular job, are available and will be gladly furnished. Holtzer-Cabot Engineering, with its accumulated years of experience, is at your command, always.

Round Metal Semi-Flush Secondary Clock

Master Clock with Automatic "Schedule Master" Program Machine

THE HOLTZER-CABOT [ELECTRIC CO.

Pioneers in School Signaling Equipment

125 Amory Street, Boston, Massachusetts

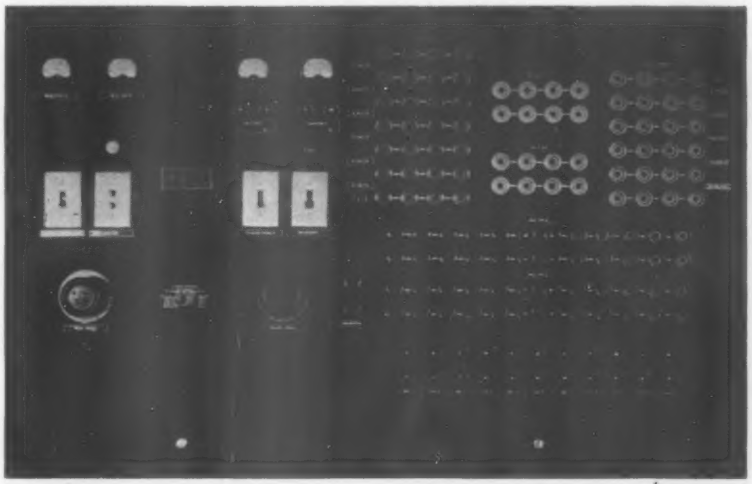
BRANCHES IN ALL PRINCIPAL CITIES

FLEXIBILITY

Holtzer-Cabot

LABORATORY PANELS

ADAPTABLE — FLEXIBLE — SAFE



Holtzer - Cabot Laboratory Panels are widely used in school and college laboratories throughout the country. They are adaptable for any number of laboratory science tables and supply all essential voltages for school work. A compact, convenient unit that centralizes current distribution and control. It has facilities for battery charging and motor generator control. All equipment is Holtzer-Cabot designed and is built in accordance with the most approved electrical standards. Let Holtzer-Cabot engineers assist you in planning your Electrical Distribution System to meet your individual needs.

AUDIO EDUCATION

Holtzer-Cabot

SOUND SYSTEMS

PROVIDE COMPLETE FACILITIES FOR DISTRIBUTION OF RADIO-PHONOGRAPH OR MICROPHONE PROGRAMS TO ANY NUMBER OF CLASSROOMS

Holtzer-Cabot Sound Systems incorporate the latest and most advanced developments in Sound Engineering and are available in types and capacities for schools of every size. In addition to distribution of programs, it may likewise be used for making announcements from the office. The System requires a central control cabinet or desk equipped with radio receiving sets, amplifiers, electric phonograph, microphones and the necessary switches for controlling the distribution to the various rooms in the school. Control cabinets may be equipped with either one, two or three radio receivers to permit a choice of programs. This cabinet is usually provided with a built-in electric phonograph and receptacles for plugging in one or more microphones.

Classrooms are usually equipped with a wall type speaker, "Built-in" behind a flush type grill. Various types of microphones are furnished to meet different requirements. Our engineers will gladly advise you the type of system best adapted to the requirements of your school.

WRITE FOR INFORMATION AND DESCRIPTIVE LITERATURE

Brochures and information will be gladly sent without obligation, on Fire Alarm Systems, Clocks, Tower Clocks and Clock Systems, Radio and Sound Systems, School Bells, Laboratory Electrical Equipment and Telephone Systems

INTERNATIONAL BUSINESS MACHINES CORPORATION

INTERNATIONAL TIME RECORDING DIVISION

Time Recorders, Electric Time, Program Signaling, Fire Alarm, Telephone, and Sound Distribution Systems

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PRODUCTS

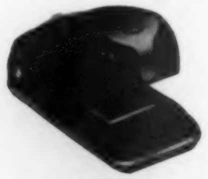
Self-regulating Electric Time Systems, Program Signaling Devices and Systems, Tower and Outside Clocks, Attendance Time Recorders, Job Time Recorders, Time Stamps, Recording Doorlocks, Watchclock Systems, Athletic Event Timers, Fire Alarm, Interior Telephone, and Central Control Sound Distribution Systems.

TIME RECORDERS, ELECTRIC TIME, AND PROGRAM SIGNALING SYSTEMS

International provides a wide variety of timing equipment suitable for the time-indicating, -signaling, and -recording needs of every type of institution, business and industrial organization. Most of the various devices operate either independently or as auxiliary units in the Self-regulating Electric Time System—a system which automatically maintains uniformly accurate time service throughout a building or group of buildings. The International Master Time Control supplies correct time for an unlimited number of auxiliary timing devices and supervises their performance. Once each hour every unit in the system is compelled to compare itself with system time and to make any necessary corrections.

A Typical Tower Clock Built Specially to Conform with Architectural Plan

Metal Case Secondary Clock

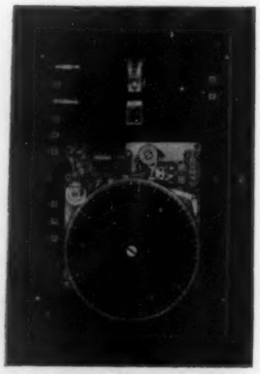


Printime Stamp

Marble Dial Secondary Clock

All-electric Direct Read Attendance Recorder

Program Chime Signal



Metal Disc Program Signal Control

Master Time Control with Mercurial Pendulum

FIRE ALARM SYSTEMS

International Fire Alarm Systems are specifically designed to provide the most dependable type of life and property protection. They are furnished in many different types to meet the varied local and State fire regulations, but all conform to a single standard that insures positive operation.

Outstanding characteristics of International Systems are: simplicity in initiating alarms; certainty that the act of pulling a lever or breaking the glass of an alarm station will set the signals into operation; and certainty that the alarms will be heard distinctly throughout the protected area.

Data sheets available in all International Offices.

Break Glass Station

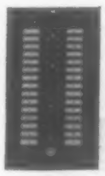
Fire Alarm Gong

Typical Fire Alarm Control Panel

All International equipment, including Fire Alarm Systems, carries the approval label of the National Board of Fire Underwriters.

INTERIOR TELEPHONE SYSTEMS

Cradle Type Telephone



Telephone Keyboard

Surface Wall Telephone

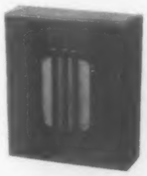
International Telephone Equipment applies strictly and exclusively to intra-communication as a means of purely local administration, management or convenience, and in no way conflicts with public telephone service. It is an automatic administrative aid that permits rapid and efficient transmission of information between individuals and departments.

International Telephone Instruments are of high quality, designed in a variety of convenient styles. Almost any kind or size system is available from a simple two-station line to a standard size switchboard exchange serving hundreds of phones.

CENTRAL CONTROL SOUND AMPLIFYING AND DISTRIBUTION SYSTEMS

To meet practically every modern day institutional, business, and industrial need, International provides a wide variety of exceptionally high quality Sound Amplifying and Distribution Equipment. There are central control type systems that distribute radio, phonograph and microphone programs simultaneously throughout a number of rooms in any one or more buildings; public address systems for auditorium and stadium amplification; and industrial paging systems.

All International Sound Equipment has been scientifically designed to preserve as nearly as possible the quality of original sound. In central control systems, the return speech feature permits direct, personal communication between any selected sound reproducer and the control cabinet.



Surface Wall Type Sound Reproducer

High Powered Horn

Microphone

Single-Channel Sound Control Cabinet

ELECTRICAL LABORATORY EXPERIMENTAL PANELS

A Typical International Laboratory Experimental Panel built to meet the requirements of a modern school science laboratory

International Laboratory Panels are for use in the science departments of schools and colleges and are designed to deliver current of different characteristics and voltages to the instructors' and students' tables or to any location where electricity is needed for experimental purposes. All voltages and types of current are made available for instant use.

Because experimental equipment is used chiefly by persons without electrical experience, safety features are of prime importance. International equipment makes it impossible to cause a short circuit accidentally with tools, connecting cords, and incorrect plugging. No exposed metal forms any part of the electrical circuits and insulation fully protects operators.

ENGINEERING AND SPECIFICATION-WRITING SERVICE

Every International office will render expert engineering and specification-writing service for the various types of low tension equipment listed above. This service is available for the asking. *Data Sheets on request.*

CONNECTICUT TELEPHONE & ELECTRIC CORP.

Manufacturers of Communicating, Signalling and Fire Alarm Equipment

Meriden, Connecticut

BRANCH OFFICES IN PRINCIPAL CITIES

PRODUCTS

TELEPHONES—Inter-communicating, Dial, Centerphone, Return-Call and Switchboard Systems
ANNUNCIATORS—for Telephone, Signal and Dormitory Return-Call Systems
BELLS AND PUSH BUTTONS—All types for Signal and Alarm Systems
FIRE ALARM—Bells, Calling Stations, Panels for all types of Systems

ADVISORY PLANNING SERVICE

Through a staff of more than 30 experienced Signal Engineers throughout the United States and Canada, CONNECTICUT offers a free Advisory Planning Service to assist school and college officials, architects, engineers, and contractors in the selection and installation details of inter-communicating, signalling and fire-alarm systems.

The functions of this service are:

1. The Connecticut Field Engineer attends preliminary consultation on objectives of the system, and offers general suggestions on equipment and specifications.

2. The Field Engineer forwards his report and plot plan (we to assume any expense entailed) to the Engineering Department at the factory.

3. The factory prepares detailed specifications and tentative riser diagrams which are returned and submitted for further discussion.

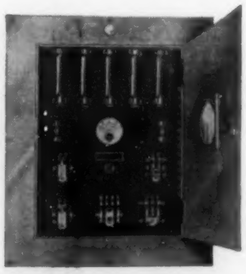
4. When acceptable, final riser diagrams showing all details of the system are made by us from the original plot plan and bound, with specifications, in convenient form to facilitate the most efficient and accurate installation by the electrical contractor.

There is no charge or obligation for this service. It is maintained for the sole purpose of making every CONNECTICUT installation completely satisfactory in every respect.

Dial-O-Phone for Central and Inter-communicating Systems

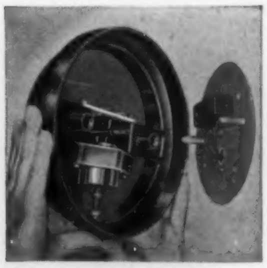
Annunciator for Dormitory Return - call Systems

Connectaphone for Room and Outlying Stations

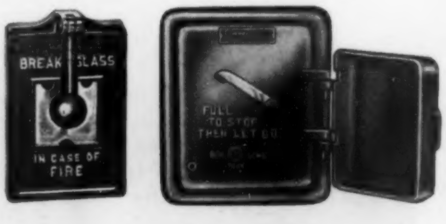


Fire Alarm Panels for Any type of System

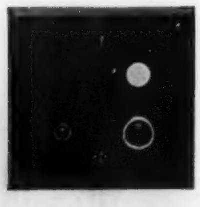
Telephone-Annunciator Systems



New Connectabell with Sealed Motor—plugs in at standard outlet box



Fire Alarm Stations of All Types—Break-glass (left); Code-call (right)



Room Station for Dormitory Return-call Systems

Private Exchange Switchboards of All Types

MONTGOMERY TIME SYSTEMS

Low Cost, Quality Program Systems

Owensville, Indiana

DEPENDABLE, precision-built program systems for small schools, high schools, colleges, industrial plants and public buildings. Designed and equipped for economical installation and simplicity of operation. Built to give long and dependable service, to keep time accurately and to fit handsomely into any office or school room.

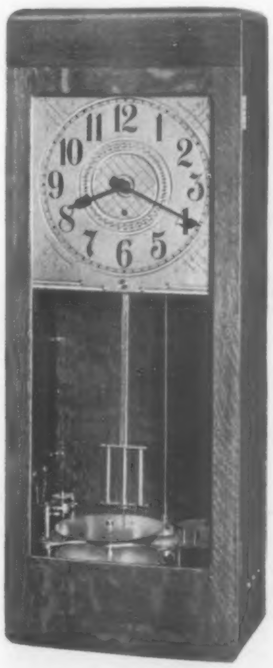
Montgomery Time Systems (formerly manufactured by the Hansen Co.) have been giving satisfactory service in hundreds of schools for more than twenty-five years. The line includes program systems to operate from 1 to 30 bells or signals on as many as five different time programs. Either synchronous electric or 8-day pendulum movements are available.

MONTGOMERY MODEL SM-3 AND B-3

The Montgomery model illustrated below is the most popular and practical for most schools and colleges. Its time movement is an improvement of the same clock that is giving more than 20 years of trouble-free service in many installations. The program mechanism is as permanent, as simple and sturdy as any you can buy.

(1) **Time Movement**—Made in the company's own factory . . . designed and built for program clock service. Not an "adapted" cheaper, less dependable movement. Electric clocks have genuine Hansen self-starting motors.

(2) **Easy to Install**—Montgomery clocks are wired and equipped for easy installation. They are sold complete with all necessary accessories except signals and wiring leading from the clock case. Each system has a bell-ringing transformer, one relay, pushbutton, manual switch and fuse for each circuit.



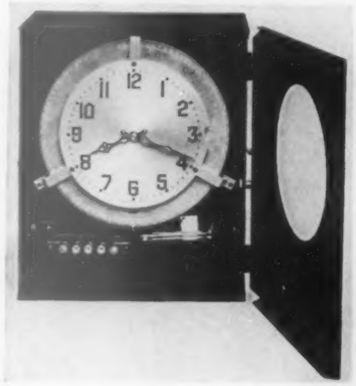
(3) **Oak Case**—The hand-rubbed lacquered oak case is finished in medium golden oak. Special cases and finishes can be supplied on special order. Cases have door lock with key.

(4) **Disk Type Program Mechanism** — The simple, sturdy program system is easy to set or change. There is nothing to tear or break.

(5) **Automatic Calendar Switch**—An automatic switch silences bells at night and over week ends. Pushbuttons are mounted on the side of the case for operating signals independently of operating mechanism.

THE *NEW* MONTGOMERY MEMO

The new **Memo** is built to fill the needs of small schools, public buildings and industrial plants requiring only one program circuit of bells. Its price brings program equipment within the reach of thousands of institutions where signals are now hand-controlled. It has the same type movement and the same rugged program systems as the larger Montgomery models. The **Memo** will control as many as 10 or more signals and ring them at 2½ or 5 minute intervals through a 12 or 24 hour period. It comes equipped with pushbutton and manual switch. Your local electrician can quickly connect it to your present bell or buzzer wiring, or install it completely in a few hours. If you have been doing without a program system because of expected high cost, it will pay you to investigate the **Memo.**



All-Metal, Fool Proof Program System—In Montgomery Program Clocks, small metal clips attached to slotted metal disks control the ringing of signals. Slots in each disk are clearly marked with the corresponding time and to change the time for sounding, simply remove the clip from one slot and insert it into the proper one. There is no paper tape to tear, no chain to break . . . no chance for ringing of bells at the wrong time. Any number of signals—from 1 to 30—can be set to sound at 2½-minute intervals through a 12-hour period. Machines for 24-hour schedules can be furnished.

WRITE FOR RECOMMENDATIONS AND ESTIMATE FOR YOUR SCHOOL

Descriptive literature, prices of systems and forms for returning information about your particular problems will be mailed on request. Prices of Montgomery Systems are held down by low selling costs

Salesman will not call unless you request it

MONTGOMERY TIME SYSTEMS
OWENSVILLE, INDIANA

THE STANDARD ELECTRIC TIME COMPANY

Springfield, Mass.

BRANCH OFFICES IN PRINCIPAL CITIES

Manufacturers of

"Standard" Electric Time, Telephone, Fire Alarm Equipment and Laboratory Current Distribution Systems

Above: **Master Clock**
Right: **Secondary Clock**

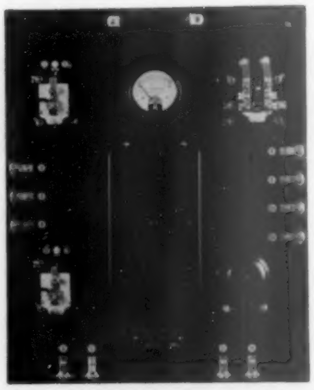
PROGRAM CLOCKS

For Schools, Industrial Plants, Public and Private Buildings

"Standard" Electric Time equipment is precision made throughout, absolutely reliable and capable of rendering long service. Standard Master Clocks can be easily and quickly adjusted to meet any program changes that may be required. Program clocks are furnished in either tape or metal disc types. All master clocks are self-winding and built to control as many secondary clocks as are required for any building. Standard automatic hourly correction control assures accurate time in every room, thereby avoiding confusion and delay.

Secondary clocks are obtainable in a wide variety of designs to harmonize with any decorative scheme.

FIRE ALARM SYSTEMS



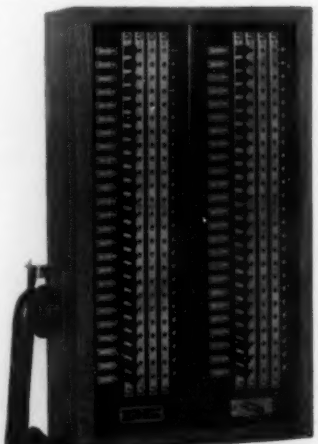
Closed Circuit Panel and Cabinet

All "Standard" Fire Alarm equipment is designed and installed to meet the most exacting requirements and is approved by the National Board of Fire Underwriters. It is available in supervised closed circuit or open circuit types also with coded stations.

Tests can be made readily by opening any station with key. Various types of bell and horn signals are available. Systems may be furnished when so specified to be automatically tested each day from program clocks before the daily school session.

TELEPHONE SYSTEMS

Consist of combination bell control board and central telephone station. Raising of receiver signals office. All calls go through central station, thus all conversations may be supervised if desired. May be installed in combination with program bells utilizing same signals and bells. Wall and hand phone models. The entire system is efficient and simple in construction, requiring practically no service whatsoever.



Above: **Standard Central Telephone Station with hand microphone set**
Left: **Standard Hand Microphone Table Set**

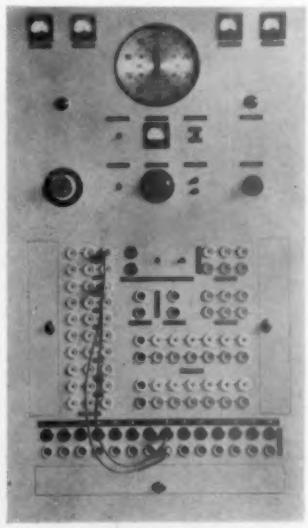
LABORATORY EQUIPMENT

Current Distribution for Physics, Chemistry, Biology and Shop Departments

Standard laboratory panels and accessory equipment are available in many designs and types to meet practically all laboratory requirements.

The Standard laboratory voltage distribution systems conveniently distribute various voltages and types of current to tables and benches and are of inestimable value in every type of school laboratory. Exclusive features include jack construction, perfect contact, colored for ready selection in various voltages, sectional battery charging, and convenient table receptacles.

Wherever Standard laboratory equipment is in use there you will find a greater interest in scientific education on the part of the students.



Typical Laboratory Experimental Panel

THE WARREN TELECHRON COMPANY

Manufacturers of *Telechron** Timekeeping Systems for Modern Schools

General Office and Factory—Ashland, Mass.

SALIENT FEATURES OF TELECHRON TIMEKEEPING SYSTEMS

CLASSROOM CLOCK

CLASSROOM CLOCK

I. Quiet operation.

II. No local master clock required.

III. Operate direct from the regulated alternating current.

IV. Available for 115 volt or 24 volt operation.

V. Each timekeeper equipped with self-starting, sealed in oil rotor, synchronous motor.

VI. No oiling, cleaning, winding or regulating.

VII. Available for individual installation or as part of a Telechron centrally controlled system.

VIII. Clocks available with sweep second hands.

IX. Clock hands move continuously around the dial.

X. National Board of Fire Underwriters' approved type construction throughout.

Your Architect has SWEET'S ARCHITECTURAL CATALOG Giving Complete Specifications

CLASSROOM BUZZER

CORRIDOR BELL

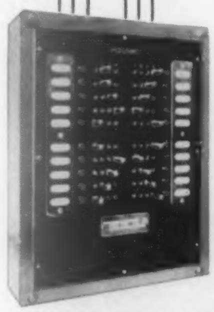
YARD GONG

Typical Telechron MDMR (Manual Dual Motor Reset) System for a school, with signals and control board

CENTRAL CONTROL

PROGRAM INSTRUMENT

SIGNAL SUPPLY



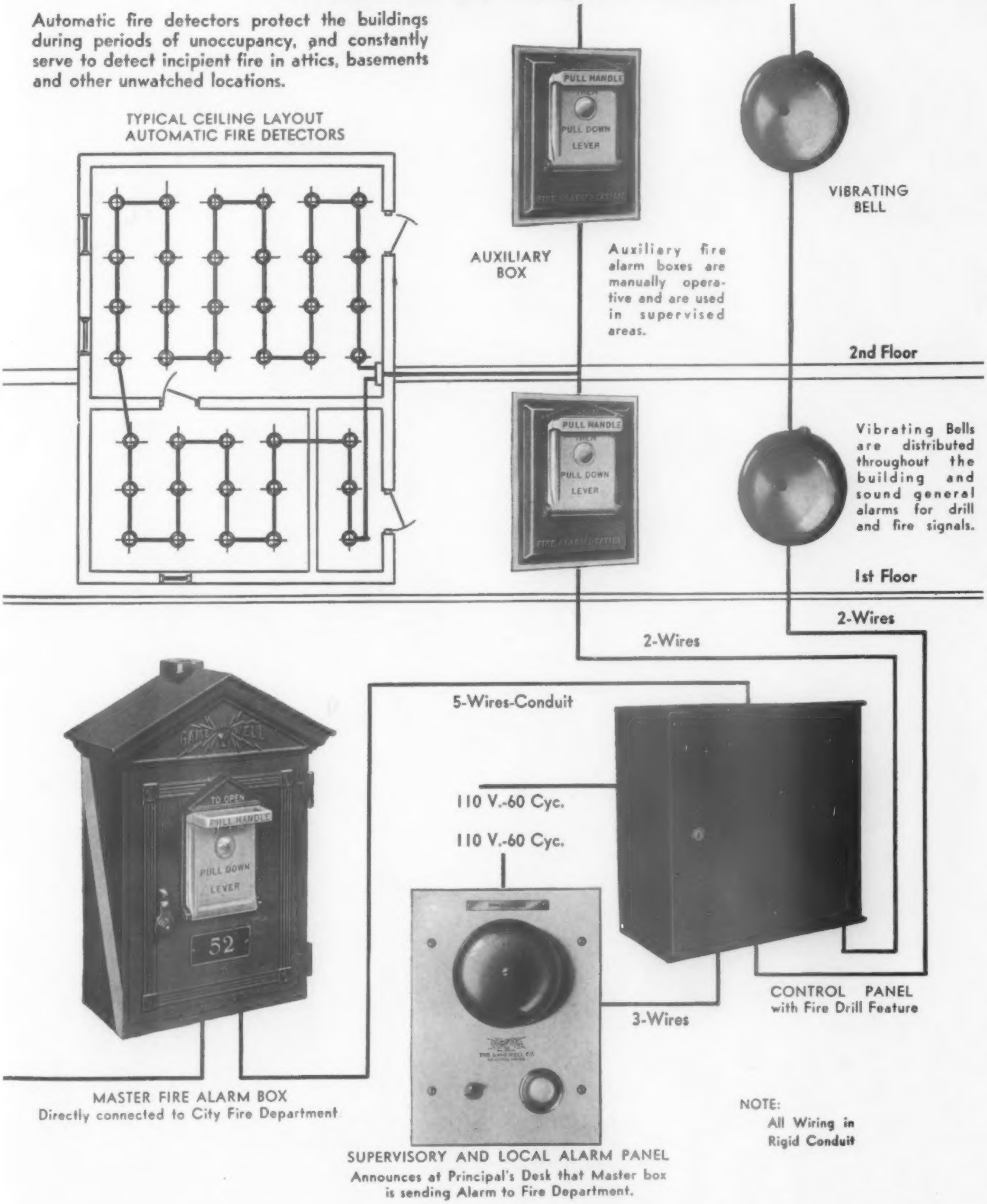
SIGNAL CONTROL BOARD

TO AC SUPPLY

* *Telechron is the trade-mark, registered in U. S. Patent Office, of Warren Telechron Company.*

A TYPICAL DUALARM SYSTEM

Automatic fire detectors protect the buildings during periods of unoccupancy, and constantly serve to detect incipient fire in attics, basements and other unwatched locations.



Exit Alarm Systems are identical with the above except that the Master box connection with the Fire Department is not supplied.

Spacing (1) Automatic fire detectors—generally the distance between centers should not exceed 15 feet with the first line $7\frac{1}{2}$ feet from the wall. (2) Auxiliary Fire Alarm Boxes—at least one on each floor located at or near exits. (3) Vibrating Bells—sufficient in number and properly distributed to be heard distinctly in all parts of the building.

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, Philadelphia, Pa.

Atlanta, Ga., 210 Walker St., S. W.
Boston, Mass., 100 Ashford St.
Chicago, Ill., 4613 So. Western Blvd.
Cincinnati, Ohio, 718-19 Temple Bar Bldg.
Cleveland, Ohio, 6400 Hermann Ave., N. W.
Dallas, Texas, 1118 Jackson St.
Denver, Colo., 810 14th St.
Detroit, Mich., 8051 W. Chicago Blvd.
Kansas City, Mo., 129 Belmont Blvd.
Los Angeles, 1043 S. Grand Ave.
Minneapolis, Minn., 617 Washington Ave., N.
New Orleans, 428 Balter Bldg.
New York, N. Y., 23-31 W. 43rd St.
Philadelphia, Allegheny Ave., and 19th St.
Pittsburgh, Pa., Union Trust Bldg.
St. Louis, Mo., 1218 Olive St.
San Francisco, Cal., 6150 Third St.
Seattle, Wash., 1919 Smith Tower Bldg.
Washington, D. C., 1819 L St., N. W.

In Canada, Exide Batteries of Canada, Ltd., 153 Dufferin St., Toronto, Ont.

Protection Against Dangers of Sudden Lighting Failure

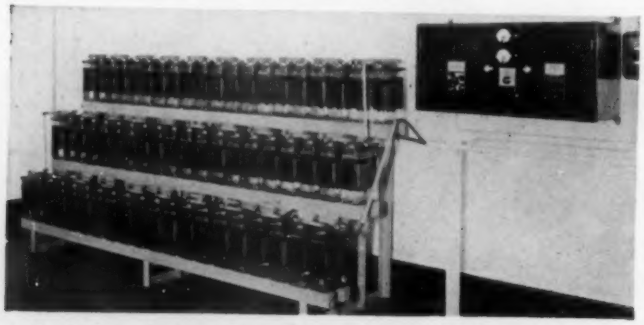
Lighting Failures Do Happen—Storms, fires, street accidents, floods, blown fuses, short circuits—all events which electric companies are helpless to foresee or prevent—do cause electric lighting interruptions.

No Community or Building Immune—Electric service interruptions occur without warning, when least expected and where least wanted. An auditorium or gymnasium crowded with pupils at sports, plays, lectures or dances, is no place to gamble with the risks of injury or damage which frequently follow the sudden darkness of a lighting failure.

Danger Unnecessary—Today, emergency lighting can be provided for the vital parts of any school building by installing Exide Keepalite. During an electric service interruption, Exide Keepalite furnishes the power from a dependable Exide Battery to the lights in auditoriums, gymnasiums, corridors, exits, fire towers, stairways, engine rooms, locker rooms, swimming pools, dormitories, laboratories, etc.

Automatic Protection—Exide Keepalite Emergency Lighting Battery Systems are completely automatic and instantaneous in operation. Electrical engineers agree that a storage battery, properly maintained, constitutes the most dependable source of emergency power. Automatic control equipment is provided for recharging the battery after an emergency discharge; and, low rate charging equipment provides the current needed to keep the battery fully charged at all times. The only maintenance required by Exide Keepalite Systems is the addition of a little water to battery cells three or four times a year. Exide Keepalite Systems assure this form of protection at a maintenance cost as low as 1½¢ a day for power.

Exide Batteries have been used in emergency service, by telephone, railroad and public utility companies since 1895. The new Exide Keepalite control equipment, which automatically keeps the battery properly maintained, represents the qualifications found desirable from the experience of more than 2000 installations in all kinds of buildings.



A Typical Exide Keepalite System with a 60-cell Exide Battery and a 30 Amp. Control Unit. It Operates Instantly and Automatically. The Infrequent Addition of Water to the Battery Is the Only Maintenance Required

IT'S THE FIRST 60 SECONDS THAT COUNT

Exide Keepalite EMERGENCY LIGHTING UNITS

For Any Size Installation—In order to economically meet the widely varying requirements of individual school buildings, 115 volt and 12 volt Exide Keepalite Systems are available. The important electrical circuits of entire buildings can be protected with the larger 115 volt systems; or, parts of buildings can be adequately safeguarded with the specially designed low voltage Exide Keepalite Systems. Depending upon the amount of protection desired, Exide Keepalite Systems can be had for $150 and up.

Superiority of Storage Battery Emergency Lighting Systems—Exide Batteries have long been used in not only emergency lighting service but also emergency power service. They safeguard the operation of railroad switches and signals, fire alarms, telephone, marine radio, industrial processes, etc.

Battery Life—Exide Batteries have long been noted for their exceptionally long life. In many industrial emergency power installations Exides have faithfully served more than 10 years.

THE ELECTRIC STORAGE BATTERY COMPANY offers the services of its trained Engineering Department to assist architects in the planning of a trouble-free Emergency Lighting System. We will be glad to send you complete descriptive literature and specifications for every type of Exide Keepalite Emergency Lighting Battery System.

This $150 Exide Keepalite Protects Lighting of Areas Up to 10,000 Sq. Ft. It Operates Instantly and Automatically

DEPENDABLE EXIDE LABORATORY BATTERIES AVAILABLE IN ANY SIZE, SEE PAGE 515

THE KINNEAR MANUFACTURING CO.

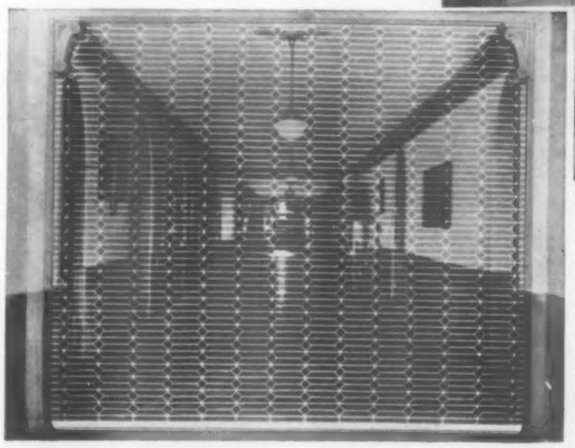
2240–2260 Fields Avenue, Columbus, Ohio

Manufacturers Exclusively of Rolling Doors and Grilles

PRODUCTS—Steel Rolling Service Doors, Automatic Fire Doors and Shutters, Metal Rolling Grilles, Wood Rolling Partitions and Wood or Steel Upward-Acting Doors.

GENERAL—The Kinnear Manufacturing Company pioneered and have devoted their entire effort for the past 44 years to rolling or Upward-Acting type Doors and Grilles. They have established the reputation throughout the world as specialists in doors that save floor and wall space, operate more conveniently, reduce maintenance expense through unusual durability and that can be built for old or new buildings for inside or outside use.

Kinnear Motor Operated Steel Rolling Service Door



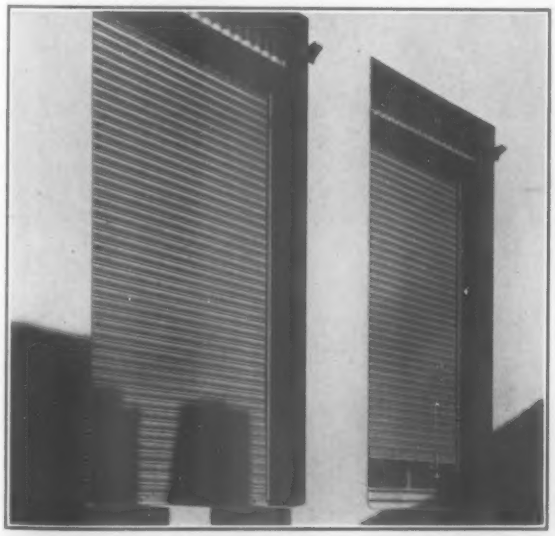
Metal Rolling Grille for Inside or Outside Use

Permanently installed but may be rolled up out of sight. When closed, admits air, light and vision. Also, if desired, may be locked to prevent raising.

STEEL ROLLING DOORS—Kinnear Steel Rolling Doors are composed of a flexible metal curtain which coils above the lintel, similar to a window shade. They can be installed either on the face of the wall or between the jambs when concealment of the mechanism is desired. Springs provide perfect counterbalance. They can also be operated manually, mechanically or electrically. Built of the finest materials and to high manufacturing standards they give years of dependable service.

METAL ROLLING GRILLES—Operating on the same principle as the Steel Rolling Door, the Kinnear Rolling Grille is a permanently installed and attractively designed barrier that is remarkably strong when closed and locked, but out of sight when opened. When down, it admits air and light, and does not obstruct vision, making it particularly applicable to all types of interior and exterior openings as well as hallways in school buildings. Built of various metals, the grille proper is of remarkable strength and artistically designed of steel bars spaced close enough to prevent the admittance of large projectiles or a man's hand. For locking in closed position a lock is furnished. The Kinnear Rolling Grille may be mounted on the face of the wall with brackets and coils entirely above the bottom of the lintel and with edges of guides flush with the face of opening jambs; or where headroom is limited and grille cannot be installed on the face of the wall it may be mounted in the opening.

AUTOMATIC FIRE DOORS AND SHUTTERS—Kinnear Fire Doors, though suitable for service purposes, are "labeled" and equipped with mechanism for automatic closure in case of fire. They are suited for installation in outside or inside door or window openings and in general construction, operation and mounting are similar to Steel Rolling Service Doors. To insure maximum fire protection they are equipped with an auxiliary push-down spring to insure positive closure; a governor for controlling speed of curtain closure; auxiliary hood to protect counterbalance mechanism; and other features in excess of the requirements of the Underwriters' Laboratories. Their superior design has proved its worth in many major conflagrations.



Automatic Fire Shutters for Windows or Doors

BRANCH OFFICES

Boston	Philadelphia	New Orleans	Cleveland	Detroit	San Francisco
New York	Washington	Pittsburgh	Cincinnati	Chicago	Baltimore

AGENTS IN ALL PRINCIPAL CITIES

KINNEAR ROLLING DOORS

CORNELL IRON WORKS, INC.

ESTABLISHED Since 1828

36th Avenue at 13th Street, Long Island City, N. Y.

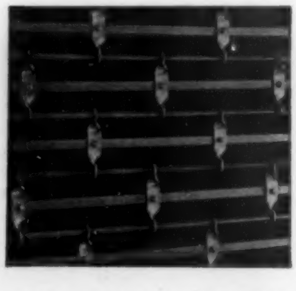
Telephone: STillwell 4-3880-1-2-3

102 REPRESENTATIVES IN PRINCIPAL CITIES

PRODUCTS

ROLLING GRILLES and GATES, in steel or other metals; SLIDING GRILLES in steel or other metals; ROLLING DOORS and SHUTTERS in steel and other metals or with non-corroding curtain bottoms; Underwriters labeled rolling STEEL FIRE DOORS; complete line of UPWARD ACTING DOORS in wood or metal; MOTOR OPERATORS; LANDSCAPING PRODUCTS.

Makers of fine doors for over one hundred and ten years. CORNELL IRON WORKS, INC., owes its origin to George Cornell, who purchased his employer's metal business July 29th 1828, in New York City.



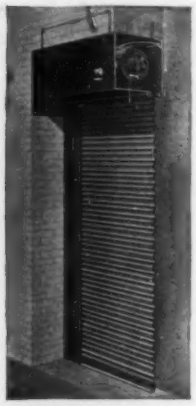
Close-up view of rolling grille curtain, CORNELL Standard BUTTERFLY TYPE

Three Cornell Rolling Grilles separating locker rooms from Gymnasium; Castlemont High School, Oakland, California

ROLLING DOORS AND ROLLING GRILLES

The doors proper are made up of interlocking metal slats running in vertical metal side guides, flexible to coil. All-steel curtains are hot galvanized.

Rolling Fire Doors are labeled by Underwriters' Laboratories, Inc., for fire walls, etc.



Cornell Iron Works, Inc., are the originators of the Rolling Grille in America. Cornell Rolling Grilles operate like rolling doors, but they do not block light, air, or vision. They have been widely accepted for school corridors, etc. Can be completely concealed when open. Rolling Grilles are made of 5/16" round hard drawn galvanized steel bars running continuous horizontally from jamb to jamb and locked into rolled steel vertical side guides. The horizontal bars are flexibly connected by unbreakable vertical certified malleable iron or steel links; permitting entire grille to coil overhead.

(Above) **Labeled Rolling Steel (Llenroc) Fire Door, coiling under lintel in the opening between the jambs. Shown in section**

Note the overhead counterbalancing shaft, used both in rolling doors and rolling grilles; and the enclosing hood. Side guides may be concealed in the wall and the overhead coil hidden in the ceiling.

Patented Locking Device for Rolling Grilles; Bars throw to both sides and engage holes in backs of side guides. Padlock or cylinder lock can be furnished, workable from either side.

CORNELL *SLIDING* GRILLES

Cornell Sliding Grilles give high protection at exceptionally low cost. It is a patented steel curtain of heaviest galvanized chain link factory fence, extended to any height of opening by galvanized rods running to track above. The grilles can be used anywhere to keep out intruders and allow free circulation of air. The construction makes it possible to nest the sliding Grilles at the side of an opening in a space only 1/6 of the opening width. Grille will travel around a curve, and lie at a right angle to opening if there is 10" room available from edge of jamb.

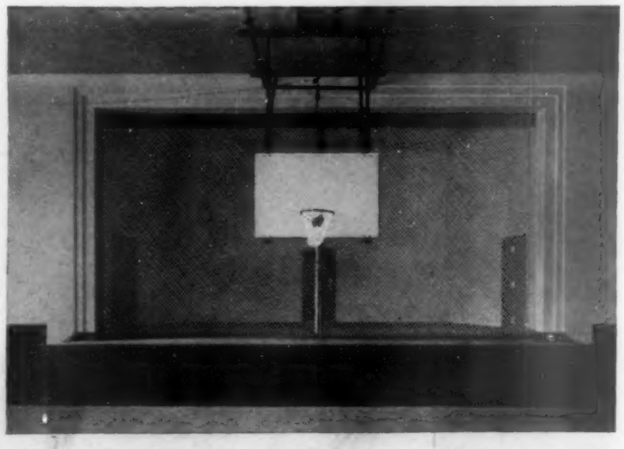
Cornell Sliding Grilles are recommended for school corridors, as a low priced substitute for Rolling Grilles; for auditoriums and stages; for gymnasium and court windows, entrances, gates or partitions; and for athletic and parking areas.

(Right) **Close-up of Sliding Grille Note steel cap at each top joint. Standard Size Grille, 10' x 12', complete $48.50 f. o. b. factory.**

SEND FOR INFORMATION

A list of schools using Cornell Doors and Grilles, and folders, will be sent upon request.

Cornell offers a complete line of rust-resisting steel, and life-time Zinc Curb edging and Drive-in fencing; also lower priced Economy Edging for driveways, walks, terraces, etc. Also strong galvanized steel wickets; and tubular steel garden stakes in 3, 4, and 5 ft. heights. Write for folders and samples.



Showing use for large Sliding Grille in combination auditorium and gym in New Jersey School

DETROIT STEEL PRODUCTS COMPANY

General Offices: 2274 East Grand Boulevard, Detroit

SALES OFFICES IN 200 CITIES

To bring you the windows you want when you want them, America's oldest and largest manufacturer of solid-section steel windows has 4 factories, 15 warehouses, 200 direct-factory offices. 16 of

Fenestra STEEL WINDOWS FOR SCHOOLS

these offices have complete engineering departments. . . . Look for "Fenestra Steel Window Company" in the alphabetical section of your telephone book—or write direct to the Detroit Office.

YOUR schools deserve the best in windows—(1) to assure the health and efficiency of children and teachers—(2) to provide architectural beauty and interior cheerfulness—(3) to afford maximum economy in first cost and upkeep.

You need windows especially developed to do these things—windows perfected through years of research and experience, in collaboration with leading school architects and authorities.

Fenestra offers you such windows—plus the services of a large staff of window experts, whose counsel is at your disposal at any time, without obligation, to help you attain the most attractive, efficient and economical window layouts.

SOME FENESTRA ADVANTAGES

1. Better Daylighting—Fenestra Windows help prevent defective vision. . . . Thanks to slender steel frames and muntins and to the absence of bulky weight boxes and slide mechanisms, they afford greater glass areas than ordinary windows—30% and more. And with them you can carry the glass line to within 1⅜" of the ceiling, to provide the important extra daylighting for desks at the room's far side.

2. Better Airation—You can have 100% window opening with Fenestra Windows—twice as much as with double-hung windows. And you can select windows with sill ventilators that deflect drafts upward, and with upper ventilators that can be opened even when it rains.

3. Easy Operation—Ventilators are designed to open easily, silently. And steel windows don't warp, shrink or swell.

4. Safe Cleaning—All Fenestra Windows are cleaned on both sides from inside the room. You save the cost of special window cleaning equipment and labor. You eliminate window cleaning hazards

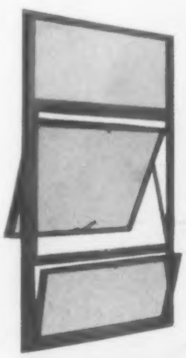
Projected Fenmark Windows in School at Northville, Michigan; Architects, Lyndon and Smith, Detroit

5. Fire Protection—Steel windows cannot burn; they help localize a fire, prevent its spread. And damage to steel windows during a fire is usually slight; restoration costs are low.

6. Lower Cost—Modern production methods now bring you steel windows at a first cost often less than that of ordinary windows. . . . Maintenance cost is cut to a minimum. . . . And you can have Fenestra Windows Bonderized and primed at the factory, for protection against rust.

THESE are but a few of the features that have made Fenestra Windows the choice for thousands of schools throughout the country. For complete information, look for Fenestra in SWEET'S—or write today for Fenestra's catalog of Heavy Casement-Type Steel Windows.

SOME TYPICAL FENESTRA WINDOWS

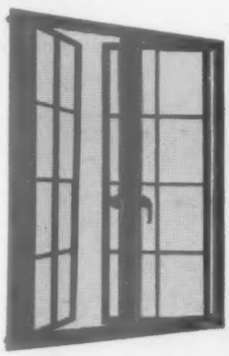


PROJECTED FENMARK

The ideal classroom window. Sill vent opens in, deflects drafts upward. Upper vents open out, form canopy over opening. Easily, economically screened and shaded.

DALMO-FENMARK

For fresh-air schools and wherever 100% ventilation is required. Vents open out; all are operated in unison through mechanism connected to bottom vent. Easily screened.



FENCRAFT CASEMENTS

Particularly adapted to dormitories, clubs and such buildings. Swing-leaves open out, for maximum fresh air. Opened, closed and locked without touching inside screens.

GENERAL BRONZE CORPORATION

34-19 Tenth Street Long Island City, N. Y.

WINDOWS · REVOLVING DOORS · ARCHITECTURAL METAL WORK · TABLETS

in Bronze, Aluminum, Stainless Steel, Nickel Silver

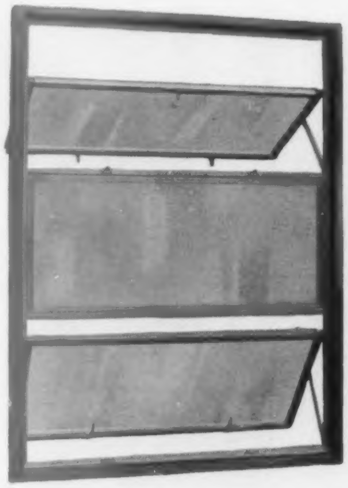
Standard Double Hung Window with Bottom Hopper

"WINDOWS BY GENERAL BRONZE"—in bronze or aluminum—can be your specification for any type of installation in schools and colleges. Whether you prefer the general utility of the double hung window, the beauty and grace of the casement window or any of the specialized types of projected windows.

No rusting, no painting, no upkeep
—will not wear out; require no replacements; do not leak air; reduce fuel and air-conditioning bills; eliminate drafts and cold spots—no felt or rubber to harden or deteriorate.

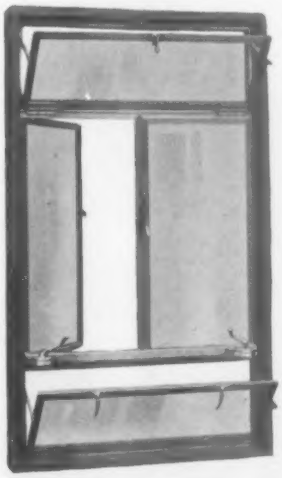
Narrow sash and frame members
—increase glass area; admit more light without increasing window size.

Continuous resilient weatherstripping
—of special metal alloy; insuring a completely air- and water-tight seal throughout the entire perimeter of sash.



Standard Series "K" Projected Window

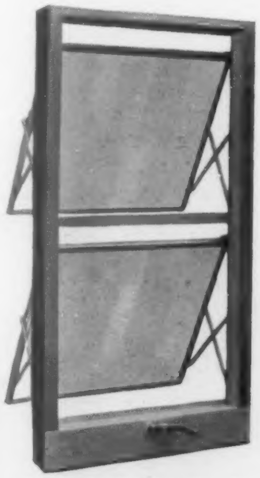
"WINDOWS BY GENERAL BRONZE" REPRESENT A SOUND INVESTMENT AND TRUE ECONOMY



Standard Series "K" Casement Window

A Few Recent School Installations

Building	Location	Architect
Rackham Graduate School	Ann Arbor, Mich.	Smith, Hinchman & Grylls
St. Pascal's Baylon School	St. Albans, L. I.	Fred J. Burmeister
Bloomfield Jr. High School	Bloomfield, N. J.	Starrett & Van Vleck
Park School	Ossining, N. Y.	Frederick Mathesius
Croton Elementary School	Croton-on-Hudson, N. Y.	Adolph H. Knappe
Junior-Senior High School	Harrison, N. Y.	Robert F. Vignola
Purdue University-Men's Residence	Lafayette, Ind.	Walter Scholer
Louisiana State University	New Orleans, La.	Weiss, Dreyfous & Seiferth
East New York Vocational High School	Brooklyn, N. Y.	Eric Kebbon
Midwood High School	Brooklyn, N. Y.	Eric Kebbon



Standard Series "K" Projected Window—Mechanically operated

A Typical Classroom equipped with Permatite Windows

Pioneer Woman
Bryant Baker, *Sculptor*

General Bronze Architectural and Ornamental Metal Work, Tablets, Statuary and Ornamental Pieces executed in true craftsmanship in Bronze, Aluminum, Stainless Steel and Nickel Silver are found in Schools and Colleges throughout the world.

Catalogs, Literature and detailed Specifications on Request

Tablets are fabricated in all types and sizes

UNIVERSAL ROLLER SCREEN COMPANY

Manufacturers of Light-Proof Shades and Ventilators

2055 North Racine Avenue, Chicago, Illinois

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Typical Lecture Room, De Paul University, Chicago

UNIVERSAL LIGHT-PROOF SHADES are ideal for use in all auditoriums, lecture, laboratory, and visual education rooms where, at times, positive darkness is essential. Attractive, long wearing, and completely dependable, these light-proof shades operate with the ease of ordinary window shades.

Three types of shades are available, the spring roller operated for average window openings, the manually gear operated for extremely large apertures, and the electrically operated for rooms where remote control is desirable.

The Cotanite cloth, absolutely opaque, is manufactured exclusively for Universal Shades. This black leatherette remains soft and pliable under varying atmospheric conditions, is crack and fade proof, noninflammable, water repellent, and odorless. The housing, side guides, bottom rail, and sill light lock are made of heavy, rust resisting steel. The interior surfaces are finished in flat black, and the exposed surfaces will be furnished in any solid color, as selected.

Universal Light-Proof Shades are custom built to fit every type of opening, whether it be in a new construction or in an existing building.

Complete specifications and details will be sent on request.

SOME RECENT UNIVERSAL LIGHT-PROOF SHADE INSTALLATIONS

De Paul University	Chicago, Ill.
Eastern Carolina Teachers College	Greenville, N. C.
Hunter College	New York, N. Y.
University of Illinois	Urbana, Ill.
Bethesda Chevy Chase High School	Washington, D. C.
Hoisington High School	Hoisington, Kan.
Lincoln School	Taft, Calif.
Madera Union High School	Madera, Calif.
St. Louis Training School	St. Louis, Mo.

LCN DOOR CLOSERS

Overhead and Floor Concealed and Surface Closers in 86 Types and Sizes

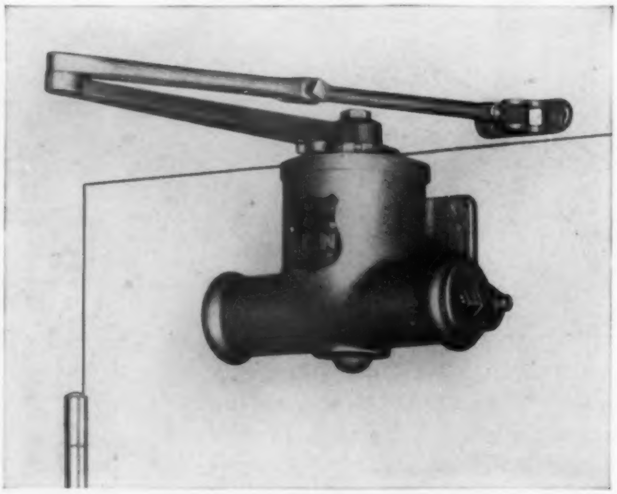
Manufactured by

Norton Lasier Company, 466 West Superior Street, Chicago, Illinois

SALES AND SERVICE REPRESENTATIVES IN 25 CITIES

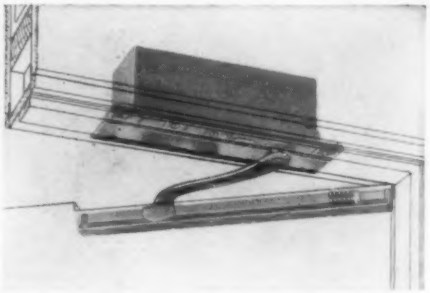
"You can save money and gain in smooth operation of plant by having the right door closers. If you don't already use LCNs, why not send for information on the full LCN line, which we just can't show on this page. No obligation at all."

THE ENTIRE LCN LINE, IN PRINCIPLE, IS BASED ON THE STANDARD SURFACE DOOR CLOSER



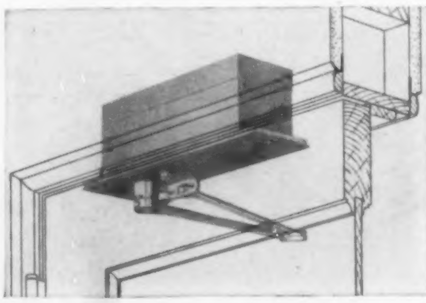
LCN STANDARD SURFACE TYPE CLOSER SIX SIZES — A TO F. A WIDE VARIETY OF FINISHES WITH OR WITHOUT HOLD-OPEN ARM

This is the utility closer most widely used in educational and other institutional buildings, where long life and superior performance at low cost are the important factors and the use of concealed closers for better appearance is impractical. It has an oversize coil spring of special analysis steel, with ample reserve power. It has the LCN full rack-and-pinion checking mechanism and ingenious adjusting screws which provide delicate control of door to fit conditions; "back check" action to protect walls or furniture on the opening swing; and two-speed action in closing and latching the door. It delivers the utmost in service, economy and general value to be found in a surface type door closer.



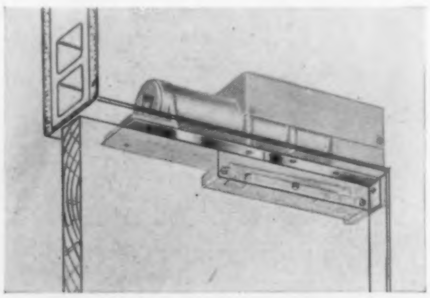
LCN SINGLE ACTING OVERHEAD CONCEALED DOOR CLOSER, NOS. 202, 204 AND 206

Recommended for entrance and other doors where appearance is important. Closer mechanism is completely concealed in the head jamb and door, with only the graceful flat steel arm visible when door is open. Full rack-and-pinion checking device with two-speed closing action easily adjustable. Furnished with or without hold-open feature.



LCN SINGLE ACTING OVERHEAD CONCEALED DOOR CLOSER, NOS. 502, 504 AND 506

Outswinging wooden entrance doors, unprotected by porch or deep reveal, are best handled by this closer, similar to the 204 or 206 except that a pair of exposed lever arms are used, which are kept on the inside of the opening.



LCN DOUBLE ACTING OVERHEAD CONCEALED DOOR CLOSER, NOS. 444, 466

With mechanism hidden in head frame and top of door, this closer furnishes smooth, complete, safe control of medium to heavy double acting doors in corridors and kitchen-dining room areas.

COLUMBUS COATED FABRICS CORPORATION

DEPARTMENT SC

Columbus, Ohio

For Wall-Tex Washable Wall Covering, see Sweet's File Index

BONTEX

IMPREGNATED PYROXYLIN . . . GUARANTEED

WASHABLE SHADE CLOTH

Columbus Coated Fabrics Corporation

A Pyroxylin-Impregnated Shade Cloth of Highest Quality—Beautiful, Extra Durable, Economical.

Bontex readily meets all the demands of today's streamlined efficiency in modern school maintenance. It is a shade cloth of extreme durability—repeatedly washable and offers enduring beauty and long-term service at low cost. Bontex, available in a number of appropriate colors, comes in three types—translucent, semi-opaque and opaque. Provides for proper controlling of daylight for all types of classrooms, locations and sun exposures—thereby assuring better light for better vision and better school work. Makes window areas give maximum light without glare. Bontex exceeds Federal specifications for shade cloth and rates "excellent" under scientific tests for quality.

BONTEX

Guaranteed Washable

WINDOW SHADE

202

CREAM

Test This Bontex Sample in Boiling Water

For proof that Bontex is impervious to water and is colorfast, boil this sample for one-half hour. Twist it after boiling, hold to light. Positively no fading, pinholing, cracking or fraying!

Bontex Is Waterproof, Colorfast—Will Not Pinhole, Crack or Fray—Can Be Scrubbed Again and Again

Bontex Pyroxylin-Impregnated Shade Cloth is impervious to water, grit and grime. It is also colorfast and will not pinhole, crack or fray under the most punishing conditions. Built to endure beating sun, wind, rain and hard, everyday usage. Can be scrubbed with soap, water and a brush more than twenty times without impairing the quality or original finish.

Conforms to Rules of Eyesight Conservation Council

Bontex provides tempered sunlight—toned down to the right intensity by three types of shade cloth to meet specific needs in the classroom, laboratory or school offices. Bontex *Translucent* lets in maximum light without glare—results in more efficient school work because of less eye strain. Bontex *Semi-Opaque* provides a softer, more diffused light. Bontex *Opaque* —absolutely black—excludes all daylight. All conform to rules of the Eyesight Conservation Council.

A Bontex Installation at Bayside High School, L. I., N. Y.

Write for Free Sample Book

Sent free to school officials on request. Shows the complete line of 12 plain colors, 5 beautiful corded designs, 5 duplex colors and 5 modern printed patterns, translucent, semi-opaque and opaque black.

Scrubbable with Soap and Water

Colorfast to Sun's Rays

Resists Rain, Snow, Wind

Withstands Rough Handling

ATHEY COMPANY

6034 West Sixty-Fifth St.

Chicago, Illinois

PERENNIAL WINDOW SHADES
CLOTH-LINED METAL WEATHERSTRIPS
ATHEY SEALTITE CAULKING COMPOUNDS

Athey Perennial

Information and prices on request

ATHEY DISAPPEARING SKYLIGHT SHADE
ATHEY VENETIAN BLINDS

ATHEY PERENNIAL WINDOW SHADES

Athey Perennial Window Shades are ideal for use in school and college buildings of all kinds, for, being translucent, the shades with the sun on them throw a soft light over the room, giving sunlight without glare, and conserving the eyesight of the pupils.

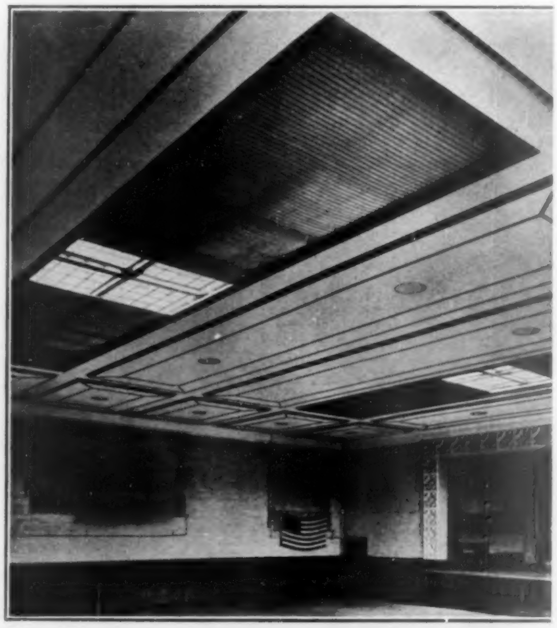
Being instantly adjustable to cover any part of the window necessary, they permit the windows being opened at both top and bottom, insuring better room ventilation, and, operating on bronze guide wires, flapping of shades when window is open is eliminated.

Made of the strongest and most durable material ever used for shades, they last longer than other shades, so on a cost per year basis are the most economical shade obtainable.

They are exceptionally attractive with their cockle finish and pleats, coming in a choice of several colors, and in widths up to seventeen feet.

The black opaque shades are useful for darkening assembly rooms and classrooms for motion picture projection.

Schools, colleges and auditoriums find Athey Shades ideal for skylights, too — the translucent shades for protecting against glare and heat, and the black shades for darkening rooms for motion pictures.



**National College of Education, Evanston, Ill.
Equipped with Athey Shades**

Write for catalog.

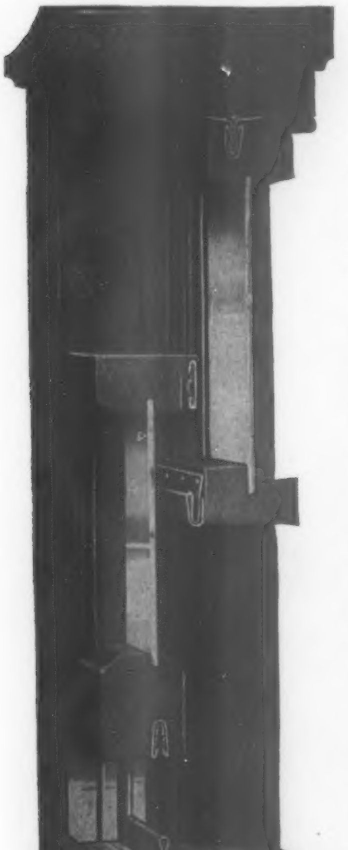
A Few of the Hundreds of Prominent Schools and Colleges Using Athey Shades:

St. Francis Academy	Joliet, Ill.
Saginaw High School	Saginaw, Mich.
State Normal College	Cortland, N. Y.
Junior Senior High School	Rye, N. Y.
Adelphi College	Garden City, N. Y.
The Choate School	Wallingford, Conn.
Wm. Penn Charter School	Philadelphia, Pa.
Henry Schaf School	Parma, Ohio
Solomon Juneau School	Milwaukee, Wisc.
Bisbee Public School	Bisbee, Ariz.
University of S. C.	Columbia, S. C.
Arlington School	Spokane, Wash.
University of Hawaii	Honolulu, T. H.
National College of Education	Evanston, Ill.
Nazareth Academy	Kalamazoo, Mich.
Junior High School	Ann Arbor, Mich.
Colt Memorial High School	Bristol, R. I.
Junior-Senior High School	Louisville, Ky.
Steuben High School	Milwaukee, Wisc.
University of Detroit	Detroit, Mich.
Toledo University	Toledo, Ohio
University of Nevada	Reno, Nev.
National College of Education	Evanston, Ill.

ATHEY WEATHERSTRIP

ATHEY Cloth Lined Metal Weatherstrip, the only weatherstrip using the cloth to metal feature, has been on the market for over 28 years. It has been installed on many of the best and largest buildings in the United States and Canada for owners and architects who desire the best, even though the initial cost is higher than for ordinary weatherstrip. Of our early installations we can point to St. Anthony's Hospital of St. Louis and the Blackstone Hotel of Chicago, who are still obtaining the maximum of efficiency after twenty-seven years of service, making the yearly cost low in comparison with cheap, ordinary weatherstrip.

Unlike the ordinary channel used in many two-piece strip installations, the Athey channel is double the ordinary width and lined with a cloth material manufactured especially for this purpose, which not only prevents all air leakage but is a dust-proofing and sound-proofing as well. Rail members are also backed with felt, which prevents leakage at the jamb, a common weakness in ordinary weatherstrip installations due to infrequent nailing of the rail member. All cloth and felt used is chemically treated, guarding against rot and deterioration, so this part of the weatherstrip, as well as the metal, is guaranteed for the life of the building. The best grade of sheet zinc is used on all strip.



No drafts, rattling of sash when Athey strip is used, and the cost of your installation will be repaid in coal savings in from two to three years. Athey Weatherstrip is installed by authorized representatives with trained workmen. Write us for catalog and name of nearest dealer.

A few of the many Schools and Colleges using Athey Weatherstrip:

Streator High School, Streator, Ill.
Western Reserve Academy, Hudson, Ohio
Purdue University, Lafayette, Ind.
Cattaraugus School, Cattaraugus, N. Y.
Johns Hopkins University, Baltimore, Md.
Wesleyan University, Middletown, Conn.
Woodlawn High School, Birmingham, Ala.
Lincoln School, Great Falls, Mont.
Sandia School, Albuquerque, N. M.

Athey Skylight Shades

School lunchroom equipped with Athey Shades

Black Shades in use in Lexington High School, Lexington, Mass.

SEALTITE CAULKING

Knife or gun grade. Permanently elastic, impervious to heat or cold, adheres to wood, stone or metal, stainless. Standard colors white and gray, special colors to order. Approved by U. S. Bureau of Standards for government use. ***Write for Illustrated Booklet.***

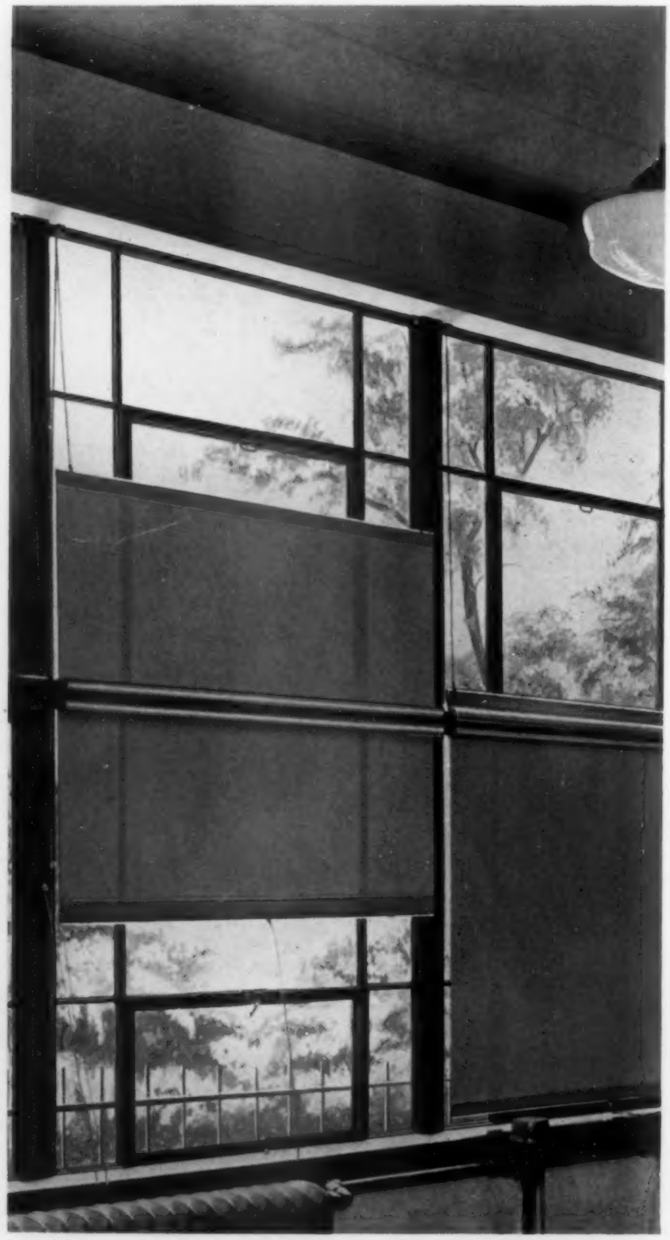
THE WESTERN SHADE CLOTH CO.

GENERAL OFFICES AND FACTORIES
22nd and Jefferson Sts., Chicago, Illinois

WILLIAM VOLKER & CO.

GENERAL OFFICES AND FACTORIES
Kansas City, Missouri
BRANCHES IN PRINCIPAL CITIES

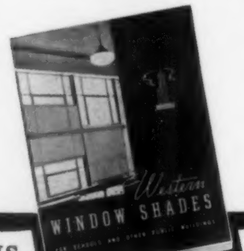
HOW WOULD YOU HAVE SPECIFIED THE *Shades* FOR THESE WINDOWS?



PROPER CONTROL of light and ventilation—assured durability—ease of installation and operation. These are the three factors that deserve prime consideration in your selection of window shades for the school room. Equipment that does not fulfill these specifications **fails** not only in its purpose . . . but in its **economy**!

CLOTH WINDOW SHADES, as designed by The Western Shade Cloth Company and William Volker & Co. and adopted as standard equipment in many schools throughout the country, have successfully offered a challenge to all other types of shade materials. Reinforcements have been **built into** the shade at the points of greatest stress permitting safe operation by the smallest child. Furthermore, only shade cloth that will not deteriorate prematurely, crack, tear easily or pinhole . . . that will stand up under repeated cleanings and give years of satisfactory service . . . has been recommended by us for school room use.

FOR A BETTER UNDERSTANDING OF the problems of selecting window shade equipment, we've prepared an interesting book that everyone responsible for school maintenance should have. The information as presented is based on more than half a century of experience in solving such problems as must be met in the school room. These books have been made available upon request—without cost or obligation—to every school executive.



THIS HANDY BOOK OF WINDOW SHADE SPECIFICATIONS IS YOURS FOR THE ASKING

BOLGER-HELLER SLATE CO.

Quarriers and Manufacturers
Bangor, Pa.

SALES REPRESENTATIVES IN THE PRINCIPAL CITIES

GENUINE
REG. U. S. PAT. OFF.
Paramount
ALBION-BANGOR
SLATE

PRODUCTS

Blackboards	**Stair Treads**
Roofing Slate	**Toilet Enclosures**
Shower Stalls	**Wainscoting**

And structural slate for all requirements

PARAMOUNT VELVET FINISH SLATE BLACKBOARDS

All slate designed for blackboards is subjected to rigid inspection and only clear blemish-free stock is used. This selected slate is polished by machine until it is entirely free of sand pits and of any surface irregularity. The level surface is then gone over carefully by hand. It is this final hand rub that produces the Paramount Velvet Finish—a writing surface of permanent satisfaction.

Facilities: Our quarries and reserve stock are adequate for all demands. Whatever your slate requirements, we invite you to avail yourself of our consulting service.

Information concerning the care and use of blackboards will be gladly sent on request.

BOLGER-HELLER SLATE COMPANY, INC.,
BANGOR, PENNSYLVANIA.

SPECIFICATIONS COVERING
"PARAMOUNT"
NATURAL SLATE BLACKBOARDS

QUALITY: All Blackboard Slate shall be quarried in the United States and be of the finest quality selected blackboard stock, even black color, free from veinings or imperfections that would impair its use or durability as a marking surface.

THICKNESS: The thickness of all finished blackboards shall be not less than ¼ inch nor more than ⅜ inch. A maximum deviation of 1/16 inch from this thickness will be permitted when an average thickness of at least ¼ inch is maintained except that double surfaced slate shall be of uniform thickness.

FINISH: The writing face of each blackboard shall be carborundum surfaced to a true, even, uniform and finely smoothed surface. Each blackboard shall be furnished with joints ground straight, true and neatly fitted.

HEIGHT: The height of all blackboards shall be 3′ 0″, 3′ 6″, or 4′ 0″ high (designate which height).

LENGTH: The length or lineal dimensions of the slate in each assembly of blackboards shall be in accordance with the U. S. Department of Commerce Simplified Practice Recommendations No. R15-35, all as follows:

Up to 5 feet, one slab;
Over 5 feet, but not exceeding 9 feet, two slabs;
Over 9 feet, but not exceeding 13 feet 6 inches, three slabs;
Over 13 feet 6 inches, but not exceeding 16 feet, four slabs;
Over 16 feet, but not exceeding 22 feet 6 inches, five slabs;
Over 22 feet 6 inches, but not exceeding 27 feet, six slabs.

JOINTS: The joints in each assembly shall be in accordance with the same Departmental Recommendation, namely, at or near the middle of the space for two slabs, one-third of the space for three slabs, one-fourth of the space for four slabs, one-fifth of the space for five slabs and one-sixth of the space for six slabs.

By "at or near" is meant that any slab may be used which places the joint within three inches in either direction of what would be exact spacing of the units stated.

A Recent Installation of Paramount Slate Blackboards in a Public School, Brooklyn, N. Y.

PITTSBURGH PLATE GLASS COMPANY

Pittsburgh, Pa.

Manufacturers of NUCITE Glass Chalkboard in Colors

WHAT NUCITE IS

Nucite is a glass chalkboard, made by fusing a colored vitreous material, hardened to resist the abrasion of chalk and eraser, to the face of Polished Plate Glass.

SUPERIOR WRITING SURFACE

Nucite's writing surface is unexcelled. It takes chalk easily, providing the maximum in easy writing for students. This excellent writing surface, moreover, is permanent, since the armored surface is practically indestructible. Nucite Chalkboards will not become slick and shiny with use. Chalk won't skip on their surfaces. And the readability of writing will not suffer with extensive use of the boards. Nucite boards never require refinishing or re-surfacing, which means lower maintenance costs.

SCIENTIFICALLY SELECTED COLORS

Nucite Glass Chalkboard is available in three standard colors . . . green, ivory and black. For the first time in history, architects are now able to specify superior chalkboards in color, with no fear that their writing surfaces will deteriorate with age. The green and ivory shades of Nucite were selected only after extensive research into the light-reflection, visual and glare factors of various colors. Recognized color and lighting experts contributed data and suggestions.

PROMOTES BETTER LIGHTING

Nucite colors are scientifically designed to promote better school lighting, and consequently, to lessen eye-strain for students using Nucite Chalkboards. The Nucite colors minimize glare, as illustrated by this experiment: Samples of Nucite and other chalkboards were subjected to accelerated wear tests, equivalent to from 15 to 17 years of hard usage under normal conditions. Specular reflection readings were taken on these samples and the readings proved that Nucite, after 15 years of use, was less affected than competing boards.

EASIER ERASURE

Nucite Glass Chalkboards afford easy, quick erasure. Where a hard, thorough scrubbing is usually necessary to prepare ordinary boards for subsequent writing, Nucite can be satisfactorily cleaned by a single stroke of the eraser. This is true of all Nucite colors.

STRENGTH AND SHOCK RESISTANCE

Although composed of glass, Nucite Chalkboards are strong, tough and remarkably resistant to shocks. The process which fuses the writing surface of Nucite to the Plate Glass base gives the entire structure far greater shock resistance than ordinary glass of the same thickness.

NON-ABSORBENT, IMPERVIOUS

Being glass, Nucite boards are non-absorbent, impervious to moisture. They can be washed as often as desired without harm. The binder in chalks, which tends to fill up the pores in ordinary boards and cause unpleasant blackboard odors, cannot cling to Nucite . . . because it has no pores, being glass. Nucite is stain-proof and odor-proof.

VARIED USES

Besides its common use as a writing surface for students, Nucite boards also serve exceptionally well as "canvas" for chalk work in art classes, and for water color painting, also, since Nucite can be washed as often as desired. Furthermore, the ivory Nucite Chalkboard makes a splendid moving picture screen.

INSTALLATION

Nucite is just as easy to install as other types of chalkboard. It cannot, however, be cut or drilled on the job, due to the fusing process employed in its manufacture. All dimensions and desired fabrication should be shown on orders so that all such work can be done at the factory before shipment is made.

COST

Nucite is slightly higher in price than ordinary chalkboards, but its many advantages more than warrant the difference. It is possible to obtain certain other colors of Nucite Glass Chalkboards in addition to the standard shades of black, green and ivory, but such special colors command a premium price, and information concerning them will be furnished only on request.

GENERAL INFORMATION

Size	minimum—4" x 4"; maximum—48" x 90"
Thickness	¼" plus or minus 1/32" tolerance
Weight	Approx. 3.32 pounds per sq. ft.

For additional information about Nucite Glass Chalkboard in colors, get in touch direct with Pittsburgh Plate Glass Company, Grant Building, Pittsburgh, Pa., or with any Pittsburgh Plate Glass Company branch.

JOHN E. LINGO & SON, INC.

Established 1897 — Manufacturers of — Telephone: Camden 487

Flagpoles in Copper Bearing Steel, Stainless Steel, Bronze, Nickel Silver and Aluminum

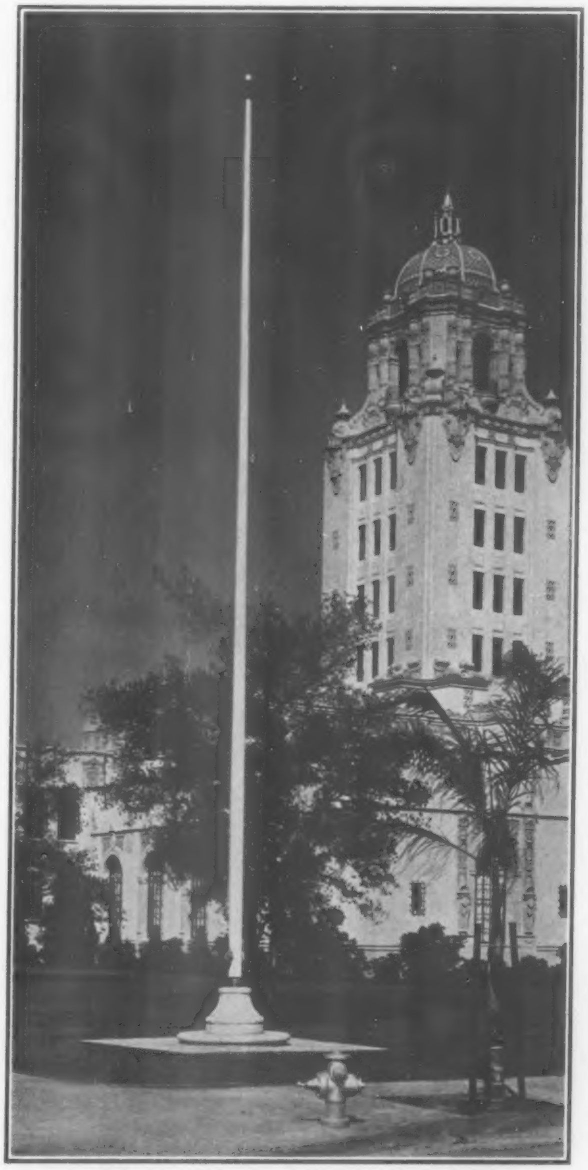
29th Street & Buren Avenue
Camden, New Jersey

TWO DISTINCT TYPES OF STEEL FLAGPOLES

CONTINUOUS STRAIGHT TAPERED FLAGPOLES

Continuous Straight Tapered flagpoles are made of **new** high grade open hearth steel, have a smooth uninterrupted exterior surface throughout without visible joints and offsets, and resemble a wooden flagpole in appearance. They are standardized in lengths from 20 ft. to 200 ft. These poles are carried in stock and prompt shipments can be made.

Continuous Straight Tapered flagpoles are ideal as replacements of wooden flagpoles, for not only is the appearance the same but the steel pole affords lightning protection, unlimited life and dependability, not usually found in wooden flagpoles.



50 Feet Above Grade, Continuous Straight Tapered Heavy Type Steel Flagpole, City Hall, Beverly Hills, Calif.

SWAGED SECTIONAL FLAGPOLES

Swaged Sectional flagpoles are fabricated in sections of **new** full weight copper bearing steel pipe with hydraulic die-swaged, telescoped and shrunk joints, made without the use of bolts, rivets, pins, screw couplings or lead calking. They are standardized in lengths from 15 ft. to 200 ft. These poles are carried in stock and immediate shipment can be made.

OTHER PRODUCTS

We also manufacture Continuous Entasis Tapered Copper Bearing Steel, Stainless Steel, Bronze, Nickel Silver and Aluminum flagpoles standardized for ground, roof or outrigger settings, in various lengths and diameters. These poles are especially suitable for monuments, memorials and other buildings of exceptional Architectural design.

CATALOGUES AND SERVICE

60-page general catalogue and descriptive pamphlets giving full information, details, specifications, prices, etc., promptly mailed on application. Our Engineering Department will gladly assist you in planning your flagpole installations most satisfactorily and economically, without obligation on your part whatsoever.

QUALITY OF PRODUCTS

NEW MATERIAL **EXCLUSIVELY** IS USED IN THE MANUFACTURE OF "LINGO" FLAGPOLES. You are guaranteed that our pipe and tubing is new, full weight and mill tested. Affidavits and mill certificates attesting to the use of new material gladly furnished if desired. We do not use second-hand, untested, mill rejected, rerolled or light weight material. Red lead and other nontransparent primers serve as an ideal medium for hiding inferior materials and construction, so "LINGO" flagpoles are painted a shop coat of nonrust transparent varnish which permits immediate and positive inspection of the material and construction used. Your selection of a "LINGO" flagpole assures a high quality product, designed by pioneer flagpole manufacturers and constructed by competent mechanics.

Inspection of Your Present Flagpoles Now May Save Lives Later!

P. O. MOORE, INC.

300 Fourth Avenue, New York, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

TELKEE

TRADE MARK

KEY CONTROL

Many millions of dollars are spent annually for locks and keys to furnish privacy or to secure valuables against prying eyes and thieving hands.

When population was scattered, buildings small and management more personal, the control of keys offered no problem. A "key rack" furnished by the local carpenter with cup hooks and with paper identification tags for keys solved most requirements.

With the advent of the "skyscraper," the hospital for hundreds of patients, the school for thousands of pupils, large businesses with tens of thousands of employees, the problem of maintaining locks and handling and controlling keys became a major problem **if the original value and purpose of the locks were to be preserved.** It is nothing extraordinary today to have accumulations of thousands, tens of thousands, of locks in one institution with two to five times that number of keys.

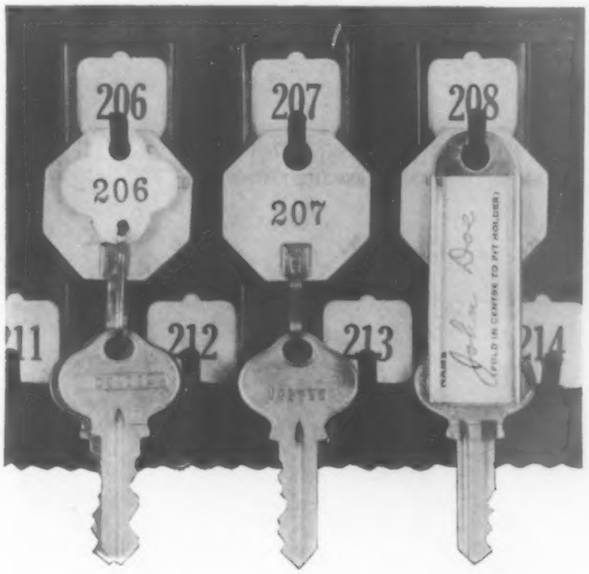
The mere housing alone of these accumulations of keys became a confused and confusing problem. Demands were made for a better, a more comprehensive and systematized method of housing and controlling; for a simple, easily operated system that would eliminate the confusion and lack of control of the older methods and reduce the rising costs of lock maintenance, variously estimated at from 50¢ to $1.50 per lock per year during the life of a building.

TelKee was offered in 1929 in response to this demand and as a solution of these problems. Today it has been a contract item on the General Schedule of Supplies of the U. S. Treasury Department for the past eight years, is required equipment with many States and Municipalities for Public Buildings and is in use as well in Office Buildings, Banks, Schools, Colleges, Hospitals, Hotels, etc.,—wherever locks are used and valued.

It has a particular value in increasing efficiency and lowering maintenance costs in Colleges and High Schools with their wealth of scientific locked equipment in addition to the usual building locks.

TELKEE IN OPERATION

FULL SIZE SECTION OF KEYBOARD, SHOWING TYPICAL TELKEE SYSTEM ARRANGEMENT



Our services are at the disposal of Architects, School Boards, Plant or Building Superintendents for consultation or to make surveys of requirements, reports of findings and suggestions. If furnished with the number of locks, the keys for which it is desired to place under adequate control, we will furnish details and cost of equipment for the required capacity.

Write for complete twelve-page descriptive catalog with samples of System Accessories.

JAS. H. MATTHEWS & CO.

Forbes & Pennant Streets, Pittsburgh, Pa.

BRANCHES

NEW YORK CHICAGO PHILADELPHIA BOSTON NEWARK SYRACUSE DETROIT

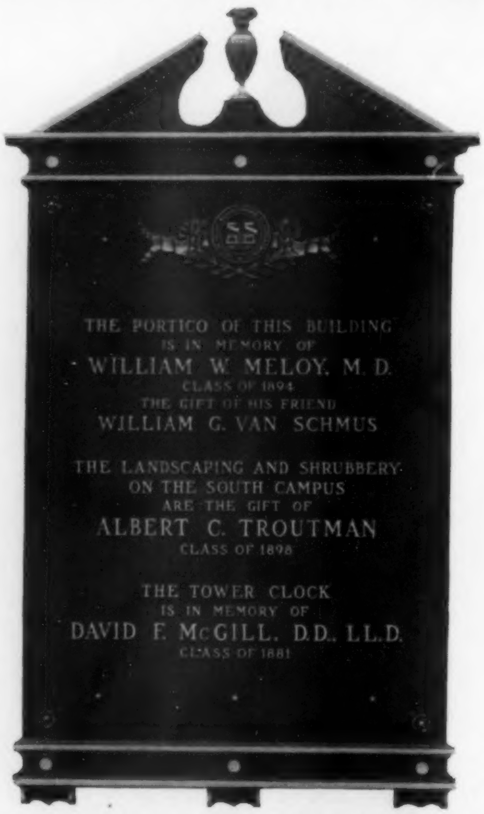
DISTRICT SALES OFFICES: Cleveland Hartford Birmingham

STATUARY BRONZE TABLETS--*Standard or Created Designs*

TABLETS of this everlasting metal are especially appropriate to honor school founders, benefactors, college presidents or notable alumni. Honor rolls perpetuate the memory of Alumni who served in the armed forces of their country. Trophies symbolize achievements in research, scholarship or athletic ability.

Appropriateness and authenticity of design combined with the finest of craftsmanship is embodied in every memorial by Matthews. Master patterns in many beautiful designs are available for economy. Special designs of our creation or to your architect's drawings are executed by master sculptors.

If you will tell us approximate size and inscription, literature, sketches and prices will be mailed to you promptly.



This is an example of a specially modelled design, for Washington and Jefferson College

COLONIAL DL 201 DESIGN. Because of its simple dignity and chaste beauty, this is a most popular design. Made in any desired size

ARCHITECTURAL OVERHEAD LETTERS

Solid Cast Bronze overhead or eye level letters are usually preferred to letters incised in stone because of their greater legibility and attractiveness.

The Classical Roman beveled face design letters illustrated are widely used and are available in many standard sizes for economy.

We can duplicate letters specially designed by the architect in any desired size.

TRAFFIC & STREET SIGN COMPANY

Flag Poles Made of Steel, Copper-Bearing Steel, Stainless Steel, Bronze and Aluminum

78 Foundry Street
Newark, N. J.

CO-OPERATION WITH ARCHITECTS AND SCHOOL OFFICIALS

Due to our many years of experience in handling floodlight, sign, radio and flag pole problems of all kinds, we are able to offer architects, contractors and building owners a well rounded service in planning, detailing and specifying the flag pole and equipment best suited to each individual installation, location factor, and budget limitation.

We have an unusually wide selection of stock bases, and shall be glad to forward sketches of them on request.

We are also equipped to fabricate special bases in accordance with architects' sketches.

We suggest that rough sketches of contemplated flagpoles be submitted to us—in order that we may prepare details, specifications and estimates of complete costs. All services offered by **Traffic & Street Sign Co.** are, of course, without charge or obligation. **We likewise are able to recommend the maximum length and number of sections that assure the most economical freight rate to any part of the country.**

CONTINUOUS TAPERED FLAG POLES

Continuous tapered flag poles are manufactured in two types: **Continuous straight taper, and Continuous entasis taper.** Straight tapered poles for roof and ground setting in copper-bearing steel are carried in stock up to 80 feet, and have a standard taper of approximately 1 inch in 7 feet. Quick delivery can be made on entasis taper, special taper, and standard taper poles up to 200 feet.

TELESCOPED SECTIONAL FLAG POLES

Telescoped sectional flag poles are manufactured in three types: **standard, heavy, and extra heavy.** Stock sizes in copper-bearing steel furnished in lengths up to 100 feet in both roof and ground-set poles. Quick delivery can be made on poles up to 200 feet. All the joints are die swaged and shrunk.

SAFETY NOTE

Architects working on new school buildings as well as all educational purchasing officials are urged to investigate the advantages for safety of steel as opposed to wood in flag pole construction. Wood poles which to all outward appearances are in good condition may have rotted inside to a point where they are early victims of the next strong blow. Furthermore, a good steel flag pole close to a building is excellent protection against lightning. Steel poles not only safeguard adjacent structures but can also be struck by a bolt without danger of collapse.

**Bloomfield Junior High School
Bloomfield, N. J.**

THE NEW "CADET" FLAG POLE

To meet the growing demand for a continuous tapered flag pole of light weight and at a cost within the reach of every school budget, **Traffic & Street Sign Co.** this year introduces the "Cadet." This new flag pole has the same construction and proportioning, the same uninterrupted surface as our standard continuous straight tapered poles — but is reduced in height to 35 feet or less. (This permits a reduction in wall thickness and in weight.) It is built strong and safe — for trouble-free service under all conditions. It is guaranteed to withstand a wind pressure of 90 miles per hour. Its newly designed halyard truck assures satisfactory operation at all times. It can be ground set (with or without base); roof set (with braces or penetrating roof); or wall set (with a wide variety of supports). It can also be used as a light-weight outrigger pole. Stocked in four sizes for immediate delivery at surprisingly moderate cost.

OTHER PRODUCTS

"Slow," "Caution," "School Zone" signs, Parking Regulation signs, Posts and Standards for all type signs, Radio Poles, Floodlighting Poles, etc.

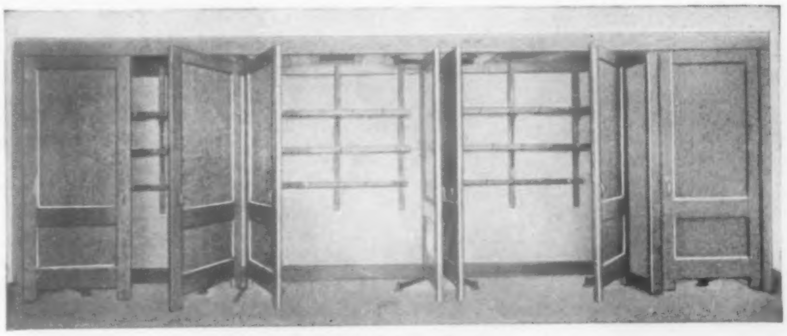
THE STANLEY WORKS

New Britain, Conn.

HARDWARE FOR SCHOOL WARDROBES

STANLEY
TRADE MARK

2705 B1—For Single Doors
2705 B2—For Pairs of Doors
With 1¼-in. clearance between door stiles and floor, and bottom rail cut out between stiles to make 4-in. clearance.
2705 C1—For Single Doors
2705 C2—For Pairs of Doors
With 4-in. clearance between door and floor.



A Typical Installation

Stanley offers complete, practical hardware for equipping doors from 18 to 48 in. in width, and any height, with a minimum depth of 25 in. from outside face of door to plaster wall. Two-foot doors project only 2 in. beyond front end of wardrobe when open, which does not hinder passage of pupils. Special hardware can be furnished for wardrobes having minimum depths to 18 in., but in such cases, two-foot doors will project up to 8 in. into the passage way.

OPERATION

Doors are hung in pairs, with single doors at the ends if desired. Pairs of doors operate in unison. It is necessary to pull only one door, to open or close both doors.

INSTALLATION

No mullions or partitions are necessary. Made to set the doors from 1¼ to 4 in. above floor. Special clearances on order. It is preferable to set the doors up from the floor to provide ventilation. The maximum space taken up in the wardrobe is 5 in. for two 1⅜-in. doors.

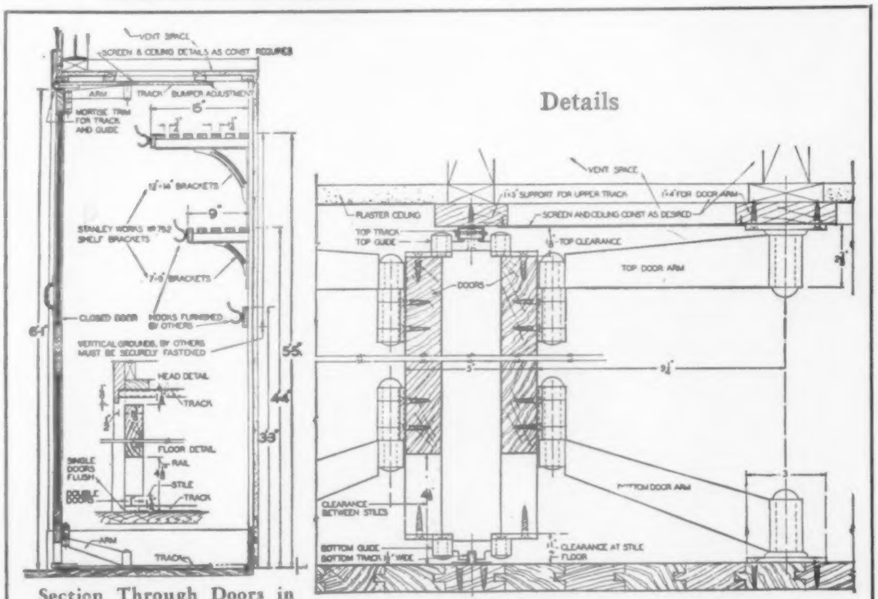
SECTIONS

The number of sections that can be had in a unit is unlimited. Three four-foot sections are usually sufficient for the average classroom, as each section provides for seventeen pupils. A single two-foot section on either end provides the teacher's locker.

HARDWARE

The extra heavy steel hinges will carry over 300 lbs. The hinge arms are 8¾ in. long, ¼ in. in thickness and set well back to avoid any tripping hazard. The pins are grooved for lubricant.

The top track and bottom rail are made of wrought steel; the guides are bronze. The bronze-on-steel bearing surface minimizes wear and insures smooth noiseless operation. Track and rail do not in any way hang or support the doors; they guide them. There is sufficient friction to prevent the doors from slamming. The track is fitted with rubber bumpers to insure quiet operation.

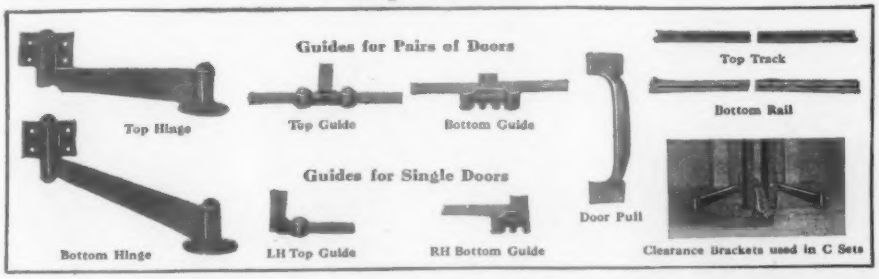


Details

Section Through Doors in Closed Position

Section Through Doors in Open Position

Component Parts



GLEASON-TIEBOUT GLASS COMPANY

99 Commercial Street, Brooklyn, N. Y.

SHOWROOMS

NEW YORK OFFICE AND CELESTIALITE DIVISION
200 FIFTH AVENUE

CHICAGO OFFICE AND SHOWROOM
20 NO. WACKER DRIVE

In all forms of school lighting the primary object should be eye protection. Light sources should be shielded and there should be ample light of good quality without excessive brightness. This can be accomplished in several ways.

DIRECT LIGHTING

An enclosing globe such as the 11290 made in high quality opal Silvaglo glass. Maximum brightness approximately 3 to 4 footcandles per square inch, light output 83.5%, low first cost, easily maintained.

SEMI-INDIRECT LIGHTING

An open bowl of dense white Washington Opal glass of the 12114 type, highly reflective inside surface, low surface brightness outside (not more than 1 CP. per sq. in.) 84.5% light output, low maintenance cost.

INDIRECT GLOBE LIGHTING

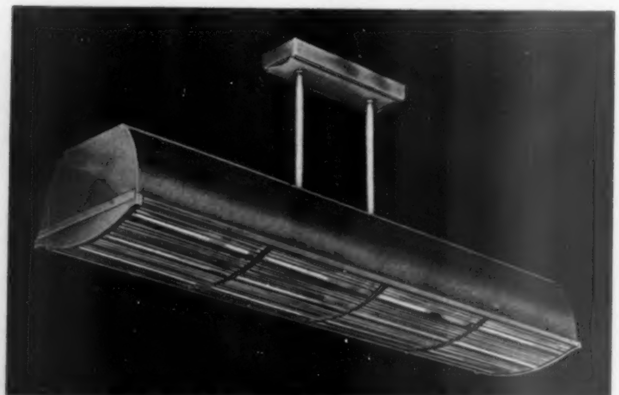
The 12305 is a dustproof globe for indirect lighting, beautiful dense white in lower bowl portion, almost clear top with over 80% of the light reflected upward. In a sixteen inch globe with 300 watt lamp, brightness in the bowl portion averages 0.9 CP. per sq. in. with light output of over 80%. This assures eye comfort with economy. This globe is made of our Low Surface Brightness L. S. B.* glass and is a one-piece single layer glass thruout. Its use in schools is urged in the interest of eye protection.

FLUORESCENT LIGHTING

If you are considering fluorescent lighting it is strongly urged that the lamps be covered with a diffusing glass. We have developed the 12359 curved diffusing plate for this purpose and it is shown mounted in the fixture illustrated.

We do not sell lighting fixtures. We manufacture and sell lighting glassware only. If you will acquaint us with details we will be glad to make recommendation based on our knowledge of glass performance.

* L. S. B. Mfr. Licensed under U. S. Pat. 1778305.



12359 curved plate for diffused fluorescent lighting mounted in fixture manufactured by Gruber Bros., N. Y. City

SECTION III

ARCHITECTS FOR EDUCATIONAL BUILDINGS

All the architects listed in this Directory are now at work on educational buildings or have designed a number of school and college buildings in recent years.

No attempt has been made to evaluate the skill or professional standing of the architects listed. Boards of Education and persons interested in the construction of new buildings can obtain valuable advice in this matter from the presidents of the local chapters of the American Institute of Architects, or from the national headquarters of that organization, The Octagon, Washington, D. C., and from such sources as the National Advisory Council on School Buildings, the United States Office of Education, the respective state departments of education, the Department of Education of the National Catholic Welfare Conference, and the Department of Educational Administration of Teachers College, Columbia University, New York.

Alabama

Bessemer

T. J. Skinner

Birmingham

Henry Sprott Long, Martin Bldg.
Charles H. McCauley, Jackson Bldg.
Miller, Martin & Lewis, Title Guarantee Bldg.
Jack B. Smith, Martin Bldg.
E. B. Van Keuren, Inc., Farley Bldg.
Warren, Knight & Davis, Protective Life Bldg.
Horace M. Weaver, Lyric Bldg.

Gadsden

Paul W. Hofferbert, 220 S. 8th St.
Matthews H. Tardy

Mobile

Dittmar & Roberts, First National Bank Annex

Montgomery

Harry H. Jones

Sheffield

Howard A. Griffith, Jr., 202 E. Fourth St.

Tuscaloosa

Don Buel Schuyler, First National Bank Bldg.

Tuskegee Institute

Louis E. Fry, Box 566

Arizona

Miami

Herman A. Bell, Box 1386

Phoenix

Alexander & Burton, Ellis Bldg.
Orville A. Bell, Heard Bldg.
Lescher & Mahoney, Title & Trust Bldg.

Tucson

James Macmillan, 537 E. Third St.
Roy W. Place, 11 E. Pennington St.

Arkansas

Fayetteville

Paul Young, Jr., McIlroy Bank Bldg.

Fort Smith

Haralson & Mott, Merchants Bank Bldg.

Little Rock

Brueggeman, Swaim & Allen, Gazette Bldg.
Erhart & Eichenbaum, Gem Bldg.
Sanders & Ginocchio, Hall Bldg.
Harry Wanger, Donaghey Bldg.
Wittenberg & Delony, Pyramid Bldg.

Pine Bluff

Mitchell Selligman, National Bldg.

California

Alhambra

Richard C. Farrell, 731 N. Marguerita Ave.
Scott Quintin, 317 W. Main St.
John Walker Smart, 1200 E. Alhambra Rd.

Bakersfield

Charles H. Biggar, Haberfelde Bldg.
Simpson & Kump, Jr., Sill Bldg.
Stanton Willard, 1314 17th St.
Frank Wynkoop, Haberfelde Bldg.

Berkeley

John J. Donovan, 950 Parker St.
P. L. Dragon & C. R. Schmidts, 2068 Allston Way
Wm. C. Hays, 2924 Derby St.
W. H. Ratcliff, American Trust Co. Bldg.

Burlingame

E. L. Norberg, 407 Occidental Ave.

Chico

A. W. Story and Louis L. Brouchoud, 116 W. 2nd St.

Del Monte

Robert Stanton and Thomas B. Mulvin, Hotel Del Monte

Fresno

W. D. Coates, Rowell Bldg.
Franklin & Kump, Jr., Patterson Bldg.
David H. Horn, Rowell Bldg.
H. Rafael Lake, Mattei Bldg.
E. Charles Parke, Rowell Bldg.
Fred L. Swartz, Brix Bldg.

Fullerton

Harry K. Vaughn, Chapman Bldg.

Glendale

Geo. J. Adams, 2430 Cascadia Drive
Postle & Postle, 501 W. Patterson St.

Hollywood

H. L. Gogerty, 1717 N. Vine St.

Long Beach

Clarence N. Aldrich, 1834 Dawson Ave.
Warren Dedrick, Heartwell Bldg.
M. Eugene Durfee, 420 Orange St.
D. Easton Herrald, 1st National Bank Bldg.
Jess J. Jones, F. & M. Bank Bldg.
Kenneth S. Wing, 501 Termino Ave.

Los Angeles

Allison & Allison, Edison Bldg.
John C. Austin, Chamber of Commerce Bldg.
M. L. Barker & G. Lawrence Ott, 624 S. LaBrea Ave.
Richard M. Bates, Jr., 3670 Wilshire Blvd.
Edwin Bergstrom, 3757 Wilshire Blvd.
Harold D. Cross, 124 W. 4th St.
Paul O. Davis, 417 S. Hill St.
Clifford K. Denman, 311 S. Spring St.
Walter E. Erkes, Rives Strong Bldg.
Ralph C. Flewelling, 816 W. 5th St.
Gable & Wyant, 3723 Wilshire Blvd.
Albert B. Gardner, H. W. Hellman Bldg.
William H. Harrison, 816 W. 5th St.
Hibbard, Gerity and Kerton, 816 W. 5th St.
Myron Hunt and H. C. Chambers, 408 S. Spring St.
Chas. M. Hutchison, Central Bldg.
Theodore Rider Jacobs, 2024 W. 6th St.
C. Raimond Johnson, University of Southern California, 3551 University Ave.
Joseph Kaiser, 5849 S. Van Ness Ave.
Gordon B. Kaufman, 627 S. Carondelet St.
Paul Kingsbury, 815 S. Hill St.
T. C. Kistner, Architects Bldg.
Samuel Lunden, Rowan Bldg.
Mackie & Squiers, Union League Bldg.
Marsh, Smith & Powell, Architects Bldg.
Albert C. Martin, Higgins Bldg.
William Mellema, 1661½ Beverly Blvd.
Richard J. Neutra, 2300 Silverlake Blvd.
A. S. Nibecker, Jr., Board of Education, 1425 San Pedro St.
Raphael A. Nicolais, 5670 Wilshire Blvd.
Perrine & Barker, Box 7803, Del Valle Station
Harry L. Pierce, 1443 Mt. Pleasant St.
Thos. Franklin Power, 6834 Odin St.
Alfred W. Rea & Chas. E. Garstang, Bradbury Bldg.
A. F. Rosenheim, Chamber of Commerce Bldg.
Edward Cray Taylor and Ellis Wing Taylor, 803 W. 3rd St.
Walker & Eisen, 405 S. Hill St.
Henry F. Withey, 407 S. Western Ave.
David J. Witmer & Loyall F. Watson, 816 W. 5th St.
A. C. Zimmerman, Architects Bldg.

Monrovia

Robert M. Finlayson, Central Bldg.

Monterey

C. J. Ryland, 136 Bonifacio Pl.

Oakland

Will G. Corlett, Bank of America Bldg.

Palo Alto

Birge M. Clark & David B. Clark, 310 University Ave.

Pasadena

Robert H. Ainsworth, 30 N. Raymond Ave.
Cyril Bennett, 595 E. Colorado St.
Walter C. Folland, 224 S. Oak Knoll Ave.
Elmer Grey, 1372 S. El Molino Ave.
Frederick Kennedy, Jr., 1041 E. Green St.
Marston & Maybury, 25 S. Euclid Ave.

Richmond

Keith O. Narbett, 468 31st St.

Riverside

G. Stanley Wilson, 3616 Main St.

Sacramento

Chas. F. Dean, 926 J St.
Harry J. Devine, Cronan Bldg.
George C. Sellon, California State Life Bldg.

Salinas

Charles E. Butner, 7 Winham St.

San Bernardino

Worswick & Culver, Fuller Bldg.

San Diego

H. Louis Bodmer, Commonwealth Bldg.
Frank L. Hope, Jr., San Diego Trust & Savings Bldg.
Jackson & Hamill, Bank of America Bldg.
Wm. Templeton Johnson, San Diego Trust & Savings Bldg.
Kistner & Curtis, Spreckels Theatre Bldg.
William P. Lodge, Fifth Avenue Bldg.

San Francisco

Blanchard & Maher, 369 Pine St.
Arthur Brown, Jr., 251 Kearny St.
Arnold Constable, 580 Market St.
Norman R. Coulter, 46 Kearny St.
Thos. M. Edwards, 9 Geary St.
Walter C. Falch, Hearst Bldg.
John J. Foley, 770 Fifth Ave.
Henry H. Gutterson, 526 Powell St.
Kent E. Hass, 525 Market St.
Masten and Hurd, 442 Post St.
Maybeck & White, Russ Bldg.
J. R. Miller and T. L. Pflueger, 580 Market St.
William Mooser, 244 Kearny St.
Frederick H. Reimers, 233 Post St.
Martin Rist, Phelan Bldg.
William Henry Rowe, 127 Montgomery St.
N. W. Sexton, De Young Bldg.
Henry C. Smith, 3807 Sacramento St.
William H. and Harold H. Weeks, 593 Market St.

San Jose

Edward W. Kress, First National Bank Bldg.

San Luis Obispo

H. B. Douglas, 75 Benton Way

San Rafael

Carl F. Gromme, 1010 B St.

Santa Ana

Austin & Wildman, Spurgeon Bldg.

Santa Barbara

E. Keith Lockard, 117 E. De la Guerra St.
Winsor Soule & John Frederic Murphy, 116 E. Sola St.

Santa Maria

Crawford and Davis, Gibson-Drexler Bldg.

Santa Paula

R. S. Raymond, Box 548
Roy C. Wilson, Box 951

Santa Rosa

C. A. Caulkins, Jr., Rosenberg Bldg.
William Herbert, Rosenberg Bldg.

Stockton

Elmore G. Ernst, 561 E. Harding Way
Victor Galbraith, 1712 Lucerne Ave.
Frank V. Mayo & Eric Johnson, 931 N. Eldorado St.
Peter L. Sala, 2130 N. Commerce St.

Ventura

Harold E. Burket, 468 E. Main St.

Colorado

Boulder

Huntington, Jones & Hunter, Citizens National Bank Bldg.

Colorado Springs

Earl A. Deits, Mining Exchange Bldg.

Denver

S. Arthur Axtens, Chamber of Commerce Bldg.
William N. Bowman, Insurance Bldg.
T. H. Buell & Co., 730 14th St.
H. W. J. Edbrooke, Tabor Bldg.
Fisher, Fisher and Hubbell, Denver National Bldg.
Edwin A. Francis, U. S. National Bank Bldg.
Robert K. Fuller, Insurance Bldg.
Eugene G. Groves, Temple Court Bldg.
John K. Monroe, 22nd St. & Broadway
Earl C. Morris, Midland Savings Bldg.
C. Francis Pillsbury, Midland Savings Bldg.
Walter H. Simon, Colorado Bldg.
Gordon D. White, 615 Columbine St.

Grand Junction

J. Lewis Ford, 122 N. 6th St.

Greeley

F. W. Ireland, Jr., Colorado State College of Education

Pueblo

DeMordaunt & Gray, Thatcher Bldg.
John Gray, Colorado Bldg.

Trinidad

Francis W. Spencer, Turner Bldg.

Wheatridge

R. O. Parry, 3855 Iolewild St.

Connecticut

Bridgeport

Frederick H. Beckwith, 19 Arcade St.

Danbury

Philip Nichols Sunderland, Inc., 81 West St.

Fairfield

O. C. S. Ziroli, 1330 Post Rd.

Hartford

Isaac Allen & Son, Inc., 32 Evergreen Ave.
Golden, Storrs & Co., 343 Fairfield Ave.
Carl J. Malmfeldt, 36 Pearl St.
William T. Marchant, 36 Pearl St.
John J. McMahon, 187 Barker St.
Frank W. Whiton, 550 Main St.

Litchfield

Ernest Sibley

Meriden

Lorenzo Hamilton, 137 Colony St.

Middletown

Carl E. Segerberg, 57 Barbara Road
W. T. Towner, 164 Court St.

New Britain

Frederic C. Teich, Maple Hill

New Haven

Brown & Von Beren, Inc., 295 Sherman Ave.
R. W. Foote, 157 Church St.
Dwight E. Smith, 956 Chapel St.

New London

Payne & Keefe, Manwaring Bldg.

Norwich

Chandler & Palmer, Thayer Bldg.

Stamford

William J. Provost—Richard J. Everett, Jr., 421 Main St.

Waterbury

Thomas M. Frency, 84 Waterville St.

West Hartford

Russell F. Barker, 17 Staples Place

Delaware

Wilmington

Walter Carlson, Delaware Trust Bldg.
Martin & Jeffers, Inc., DuPont Bldg.
Massena & DuPont, 704 Delaware Ave.
G. Morris Whiteside, 2nd, DuPont Bldg.

District of Columbia

Washington

Rhees E. Burket, 726 Jackson Pl.
Albert I. Cassell, 1903 14th St., N. W.
Faulkner & Kingsbury, 917 15th St.
Otis Harvey Miller, McLachlen Bank Bldg.
Frederick V. Murphy, 1413 H St., N. W.
Upham & Adams, 808 17th St., N. W.
A. Hamilton Wilson, 1621 Connecticut Ave.
Nathan C. Wyeth, Municipal Architect, District Bldg.

Florida

Daytona Beach

Harry M. Griffin, 309 N. Grandview Ave.

Gainesville

Rudolph Weaver, Peabody Hall, University of Florida

Jacksonville

Mellen C. Greeley, Barnett National Bank Bldg.
Olof Eskil Segerberg, Box 4242
Max L. Worthley, 605 Ocean St.

Lakeland

W. B. & Thomas V. Talley, 201½ E. Lemon St.

Miami Beach

August Geiger, 731 Lincoln Rd.

Pensacola

S. J. Welch, 1306 E. Jackson St.
Yonge & Hart, 406 Thiesen Bl.

St. Petersburg

Archie G. Parish, Empire Bldg.
Henry L. Taylor, Empire Bldg.

Sarasota

J. H. Johnson, Box 147

Stuart

Bert D. Keck, Box 917

Tallahassee

E. D. Fitchner, 650 E. College Ave.
T. Angus MacEwen, 108 Briarcliffe Drive
Herbert D. Mendenhall, 814 N. Jefferson St.
James A. Stripling, State Department of Education

Winter Park

Harold Hair, 222 E. Park Ave.
Jas. Gamble Rogers, II

Georgia

Atlanta

W. Montgomery Anderson, Citizens & Southern Bank Bldg.
Wm. J. J. Chase, 140 Peachtree St.
David S. Cuttino, Jr., and Associate, Peters Bldg.
Daniell & Beutell, Ga. Savings Bank Bldg.
J. H. Gailey, Georgia School of Technology
Hentz, Adler, & Shutze, Candler Bldg.
Ivey & Crook, Candler Bldg.
Henry H. Jordan, Healey Bldg.
R. Kennon Perry, Mortgage Guarantee Bldg.
Odis Clay Poundstone, Palmer Bldg.
Arthur Neal Robinson, Sr. & Jr., Henry Grady Bldg.
Sayward & Logan, Palmer Bldg.
Norman F. Stambaugh, Citizens & Southern National Bank Bldg.
Jess Wilhoit, Mortgage Guarantee Bldg.

Augusta

Brown & Eve, Masonic Bldg.
F. Arthur Hazard, Masonic Bldg.
Willis Irvin, S. F. C. Bldg.
Scroggs & Ewing, Southern Finance Bldg.

Columbus

T. F. Lockwood, Box 34

Macon

Dennis & Dennis, 556 Mulberry St.
W. Elliott Dunwody, Jr.
Ellamae Ellis League, Grand Bldg.

Rome

Stewart A. Marshall, Jr., 500 Second Ave.

Savannah

Cletus W. Bergen, Liberty Bank Bldg.
Levy & Clarke, Liberty Bank Bldg.
Walter P. Marshall, 228 E. 51st St.

Statesboro
W. H. Aldred, Jr., 38 W. Main St.

Idaho

Boise
Tourtellotte & Hummel, Eastman Bldg.
Wayland & Fennell, Box 1277

Idaho Falls
L. E. Stalker, Jennie Rogers Bldg.

Lewiston
Hugh Richardson, Weisgerber Bldg.

Nampa
Lee R. Cooke, 1222 1st St., S.

Pocatello
Frank H. Paradice, Jr., Dietrich Bldg.

Twin Falls
Burton E. Morse, Holmes G. Lash, Fidelity National Bank Bldg.
Andrew McQuaker, 435 2nd Ave., N.

Illinois

Alton
Deeter & Drake, Alton Banking & Trust Bldg.
James M. Maupin, Commercial Bldg.
L. Pfeiffenberger's Sons, 102 W. 3rd St.

Aurora
W. J. vander Meer, 70 S. May St.

Belleville
Rubach & Weisenstein, Belleville National Bank Bldg.

Bloomington
Lundeen & Hilfinger, Corn Belt Bank Bldg.
Schaeffer & Hooton, Peoples Bank Bldg.

Champaign
F. E. Berger & R. L. Kelley, 44 Main St.
George E. Ramey & Co., Robeson Bldg.

Chicago
William N. Alderman, 19 E. Pearson St.
Alfred P. Allen & Maurice Webster, Assoc., 225 N. Michigan Ave.
Gerald A. Barry, 5202 W. Chicago Ave.
Burnham & Hammond, Inc., 160 N. LaSalle St.
Childs & Smith, 430 N. Michigan Ave.
John C. Christensen, Board of Education, 228 N. LaSalle St.
John D. Chubb, 109 N. Dearborn St.
John Leonard Hamilton, 814 N. Tower Court
Charles Hodgdon, 111 W. Monroe St. St.
Holabird & Root, 333 N. Michigan Ave.
Holmes & Flinn, 8 S. Dearborn St.
Jansson & Venning, 740 Rush St.
C. I. Krajewski, 844 Rush St. (also at Dubuque, Iowa)
Godfrey E. Larson Inc., 77 W. Washington St.
H. T. Liebert, 5112 N. Kenmore Ave.
Joseph C. Llewellyn Co., 38 S. Dearborn St.
Perkins, Wheeler & Will, 2204 Merchandise Mart
E. E. Roberts and Elmer C. Roberts, Inc., 128-82 W. Washington St.
Robert Work, 75 E. Wacker Drive

Danville
Liese, Ludwick, & Jones, Temple Bldg.

Decatur
Bramhall, Dague & Carter, Standard Office Bldg.
S. A. Clausen, Standard Bldg.
Engineering Service Corporation, Decatur Club Bldg.
Charles Harris, Standard Office Bldg.

East St. Louis
Kennedy & Goedde, First National Bank Bldg.
Knoebel & Pabst, Spivey Bldg.

Elgin
Leroy W. Thompson, 355 Congdon Ave.

Galesburg
Aldrich & Aldrich, Bondi Bldg.

Highland Park
John S. Van Bergen, 234 Cedar Ave.

Kewanee
John A. Scribbins, 108½ W. First St.

Lincoln
Deal & Deal, I. O. O. F. Bldg.

Metropolis
S. Lester Daly

Moline
M. R. Beckstrom, 1518 5th Ave.
William H. Schulzke, Fifth Avenue Bldg.

Mt. Vernon
McCoy and Wilson, First National Bank Bldg.

Murphysboro
R. Z. Gill & Co., 1328½ Walnut St.

Ottawa
Louis H. Gerding, 708 LaSalle St.

Peoria
Jameson & Harrison, Alliance Life Bldg.

Rockford
Bradley & Bradley, Brown Bldg.
Gilbert A. Johnson, 501 7th St.
Raymond A. Orput, Empire Bldg.

Rock Island
Cervin & Stuhr, Safety Bldg.
Benj. A. Horn, Rock Island Bank Bldg.

Springfield
Harry J. Reiger, Security Bldg.

Urbana
J. W. Royer, H. B. Davis, Associates, 209 S. Broadway
Smith, Kratz & Strong, 101 S. Broadway
Ernest L. Stouffer, Administration Bldg.

Waukegan
Ekstrand & Schad, 118 N. Genesee St.

Indiana

Anderson
E. F. Miller, Anderson Bank Bldg.
Ernest R. Watkins, Citizens Bank Bldg.

Cicero
A. A. Faulstich, Box 110

Connersville
Henkel & Hanson, 715½ Central Ave.

Crawfordsville
Carroll O. Beeson, Ben Hur Bldg.

Dana
H. L. Fillinger

East Chicago
Michael S. Bittner, 721 W. Chicago Ave.
C. I. Botteron, 4005 Main St.
Karl D. Norris, Calumet Bldg.

Evansville
Edwin C. Berendes, 121 N.W. 4th St.
Harry E. Boyle & Co.

Fort Wayne
Le Roy Bradley, 225 E. Berry St.
Albert Heeter, Lincoln Tower
A. M. Strauss, Calwayne Bldg.

Frankfort
Leonard & Wolf, Thrasher Bldg.

Gary
Joe H. Wildermuth & Co., 527 Broadway

Hammond
W. S. Hutton, 5231 Hohman Ave.

Indianapolis
D. A. Bohlen & Son, Majestic Bldg.
Everett I. Broun, 808—148 E. Market St.
Burns & James, 333 N. Penn St.
Robert Frost Daggett, 445 N. Pennsylvania St.
Graham & Knowlton, Security Trust Bldg.
McGuire & Shook, Fletcher Trust Bldg.
M. G. Thompson, 5709 Broadway Terrace
C. D. J. Zimmerman, Inc. & Associates, 3538 N. Meridian St.

Kentland
John A. Bruck

Lafayette
Walter Scholer, 1114 State St.

Logansport
Henry C. Wolf, 316 Heath St.

Michigan City
Phelps & Peck, Inc., Brinckmann Bldg.

Muncie
Houck & Hamilton, Patterson Bldg.
Geo. F. Schreiber, 1003 University Ave.
Smenner & Carlson, 611 E. Jackson St.

New Albany
Hawkins & Walker, Elsby Bldg.

Richmond
Werking & Son, 2000 E. Main St.

South Bend
Ennis R. Austin, J. M. S. Bldg.
Willard M. Ellwood, Christman Bldg.
Maurer & Maurer, 107 Lincoln Way, E.
Callix E. Miller, Union Trust Bldg.
Ernest W. Young, Sherland Bldg.

Terre Haute
Miller & Yeager, Opera House Bldg.

Vincennes
Lester W. Routt, Citizens Trust Bldg.

Westport
O. W. Holmes

Iowa

Ames
Allen Holmes Kimball, Iowa State College

Burlington
Robin B. Carswell, F. & M. Bank Bldg.

Cedar Rapids
Mark Anthony, O.R.C. Bldg.
W. J. Brown, Higley Bldg.
Norman Hatton, Higley Bldg.
Chas. B. Zalesky, Mer. Nat'l Bank Bldg.

Davenport
Arthur H. Eberling, Kahl Bldg.
Kruse & Parish, Kahl Bldg.
Seth J. Temple, Union Bank Bldg.

Decorah
Charles Altfillisch, 126½ W. Water St.

Des Moines
Dougher, Rich & Woodburn, Old Colony Bldg.
Keffer & Jones, Masonic Temple.
John Normile, Hubbell Bldg.
Proudfoot Rawson—Brooks & Borg, Hubbell Bldg.
Oren Thomas, Des Moines Bldg.
Tinsley, McBroom & Higgins, Hubbell Bldg.

Forest City
Thorwald Thorson

Fort Dodge
E. O. Damon, East Mason Bldg.
Frank W. Griffith, Snell Bldg.

Iowa City
Geo. L. Horner, State University of Iowa

Mason City
Hansen & Waggoner, 11½ S. Federal Ave.

Sioux City
Beuttler & Arnold, Insurance Exchange Bldg.

Waterloo
M. B. Cleveland, 424 E. 4th St.

Kansas

Abilene

Frank H. Cayton, Citizens Bank Bldg.

Chanute

Wolpert & Newcomb, Mercantile Bldg.

Clay Center

Hal Wheelock, 1405 Fifth St.

Emporia

Brinkman & Hagan, Citizens Bank Bldg.
A. E. Buck, Emporia State Bank
W. F. Marx, 715 Commercial St.

Hutchinson

Harold T. English, Nelson Bldg.
McCrackin and Hiett, 308 W. 20th St.
Mann & Co., Wiley Bldg.

Kansas City

Jos. W. Radotinsky, Commercial National Bank Bldg.

Ottawa

C. A. Washburn, 220½ S. Main

Salina

Ben H. Byrnes, National Bank of America Bldg.
Chas. W. Shaver, United Life Bldg.

Topeka

Cuthbert & Suehrk, 735 Kansas Ave.
W. E. Glover, National Reserve Bldg.
Ralph E. Scamell, 1204 Boswell St.
Louis H. Spencer, Central Bldg.
Thos. W. Williamson & Co., National Bank of Topeka Bldg.

Wichita

Forsblom & Parks, Beacon Bldg.
Overend & Boucher, Brown Bldg.
Clarence C. Robinson, 540 S. Madison St.
Lorentz Schmidt, 1832 E. 2nd St.
Glen H. Thomas, 125½ N. Topeka Ave.

Kentucky

Ashland

H. Clell Hayes, Professional Arts Bldg.

Bowling Green

J. M. Ingram, 919 Park St.

Covington

Chester H. Disque, 1212 Highway St.
B. T. Wisenall, First National Bank Bldg.

Frankfort

C. Julian Oberwath, 301 2nd St.

Harlan

D. E. Perkins, Greene Smith Bldg.

Hazard

H. A. Spalding

Hopkinsville

John T. Waller, 1700 S. Virginia St.

Lexington

Wm. B. Brock, Radio Bldg.
H. A. Churchill, Citizens Bank Bldg.
Frankel & Curtis, McClelland Bldg.
John T. Gillig, Radio Bldg.
Hugh Meriwether, Radio Bldg.
John F. Wilson, 131 W. Short St.

Louisville

E. T. Hutchings, Heyburn Bldg.
Joseph & Joseph, Breslin Bldg.
D. X. Murphy & Bro., Inc., Louisville Trust Bldg.
Nevin, Morgan & Kolbrook, Starks Bldg.
Thomas J. Nolan & Son, Kentucky Home Life Bldg.
V. Earle Otis, Speed Bldg.
Arthur G. Tafel, 140 S. 3rd St.

Owensboro

Walter Scott Roberts, 115 E. 4th St.

Louisiana

Alexandria

C. Errol Barron, Guaranty Bank Bldg.
Herman J. Duncan & Co., Inc., Box 885
Max J. Heinberg, Weil Bldg.
Charles T. Roberts, Guaranty Bank Bldg.

Baton Rouge

Bodman & Murrell, Reymond Bldg.
Stanley Brown, Box 2246
Robert H. Goodman, Wieck Bldg.
Geo. A. Thompson, 424 State St.
A. Hays Town, Louisiana National Bank Bldg.

Lafayette

Favrot & Reed & Frederick J. Nehrbass, 123 Edgewood Terrace

Metaire Ridge

Ada Arnold Langridge, 215 Lake Ave.

Monroe

H. H. Land
J. W. Smith & Associates, Ouachita National Bank Bldg.

New Orleans

William R. Burk, Balter Bldg.
Edgar A. Christy, Orleans Parish School Board, 703 Carondelet St.
Diboll-Kessels & Associates, Baronne Bldg.
Favrot & Reed, Nola Bldg.
Moise H. Goldstein & Associates, American Bank Bldg.
Jones, Roessle & Olschner, Maison Blanche Bldg.
William T. Nolan, Queen & Crescent Bldg.
Allison Owen, Canal Bldg.
Theo. L. Perrier, Balter Bldg.
Weiss, Dreyfous & Seiferth, Maison Blanche Bldg.
Wogan & Bernard, Baronne Bldg.

Shreveport

Samuel G. Wiener, Ardis Bldg.
Peyton & Annan, Giddens Lane Bldg.

Maine

Bangor

Crowell & Lancaster, 6 State St.

Portland

Miller & Beal Inc., 465 Congress St.

Presque Isle

John C. LeVasseur, 313 N. Main St.

Maryland

Baltimore

O. Eugene Adams, 329 N. Charles St.
John A. Ahlers, 4810 Roland Ave.
Crisp & Edmunds, Calvert Bldg.
Wm. W. Emmart, Munsey Bldg.
Bernard Evander, 20 E. Lexington St.
Benjamin Frank, 15 W. Franklin St.
Clyde N. & Nelson Friz, Lexington Bldg.
Lucien E. D. Gaudreau, 527 N. Charles St.
E. H. Glidden, Jr., 513 Charles St.
David Harrison, 421 St. Paul St.
Henry Powell Hopkins, 10 E. Mulberry St.
Harry L. Katz, 3212 Gwynns Falls Park
Frederick L. W. Moehle & Associates, 409 N. Charles St.
Henry G. Perring Co., 10 W. Chase St.
Taylor & Fisher, 1012 N. Calvert St.

Hagerstown

A. J. Klinkhart, Franklin Court

Hyattsville

Kea, Ross & Walton, Professional Bldg.

Salisbury

Edwin Wilson Booth, Box 888
Malone & Williams

Silver Spring

Howard Cutler & Katherine Cutler, 711 Dale Drive
Stanley W. Hahn, 1511 East-West Highway
Donald S. Johnson, 9405 Thornhill Road
Laurence P. Johnston, 9210 Midwood Road

Takoma Park

Ronald Senseman, 1100 Carroll Ave.

Massachusetts

Boston

Ames, Child & Graves, 50 Beacon St.
Andrews, Jones, Biscoe & Whitmore, 50 Congress St.
Appleton & Stearns, 53 State St.
J. Williams Beal, Sons, 185 Devonshire St.
Francis D. Bulman, 1078 Boylston St.
Collens, Willis & Hubbard, 75 Newbury St.
Coolidge & Carlson, 89 State St.
Coolidge, Shepley, Bulfinch & Abbott, 1 Court Et.
Frank Irving Cooper Corp., 20 Kilby St.
Cram & Ferguson, 248 Boylston St.
Desmond & Lord, 1 Beacon St.
Ralph Harrington Doane, 7 Water St.
William W. Drummey & Co., 168 Dartmouth St.
M. A. Dyer Co., 8 Beacon St.
Charles R. Greco, Inc., 11 Beacon St.
John P. Heffernan, 131 State St.
Henry & Richmond, 177 State St.
Hutchins & French, 11 Beacon St.
Kilham, Hopkins & Greeley, 126 Newbury St.
James H. MacNaughton, 234 Boylston St.
Maginnis & Walsh, Statler Bldg.
Markus & Nocka, 184 Boylston St.
McLaughlin & Burr, 88 Tremont St.
Perry, Shaw & Hepburn, 141 Milk St.
Isidor Richmond, 248 Boylston St.
James H. Ritchie & Associates, 20 Newbury St.
Louis Warren Ross, 20 Kilbury St.
Richard Shaw, 25 Huntington Ave.
George H. Sidebottom, 120 Milk St.
Sturgis Associates, 120 Boylston St.

Fall River

Israel T. Almy, 56 N. Main St.
E. M. Corbett, 49 Purchase St.

Fitchburg

S. W. Haynes & Associates, 336 Main St.

Greenfield

James A. Britton, 78 Federal St.
Bernhard Dirks, 20 Federal St.

Haverhill

Morse, Dickinson & Goodwin, 25 Washington Sq.

Lawrence

Ashton & Huntress, 477 Essex St.

Leominster

Harold E. Mason, 15 Prospect St.

Lynn

George A. Cornet, 14 Central Ave.

Newton

Edmund I. Leeds, 46 Waverly Ave.

Northampton

Frank Mark Mahoney, 199 Main St.

Norwood

William G. Upham, Bigelow Bldg.

Springfield

D. R. Baribault, 166 Buckingham St.
Morris W. Maloney, 220 Dwight St.

Wellesley

Wm. B. Colleary, 240 Ridgeway Road

Worcester

Lucius W. Briggs Co., 90 Park Ave.
O. E. Nault & Sons, 48 Hamilton St.

Michigan

Ann Arbor

Fry & Kasurin, First National Bank Bldg.

Battle Creek

A. B. Chanel, 9 Merwood Drive
Lewis J. Sarvis, Bailey Bldg.

Bay City

Joseph C. Goddeyne, Bay City Bank Bldg.

Birmingham

J. Robert F. Swanson, Wabeek Bldg.

Bloomfield Hills
Eliel & Eero Saarinen

Dearborn
Bennett & Straight, Schaefer Bldg.
Harry C. Vicary, 22148 Michigan Ave.

Detroit
Derrick & Gamber, Inc., Union Guardian Bldg.
George F. Diehl, 120 Madison St.
J. Ivan Dise, 2631 Woodward Ave.
Donaldson & Meier, Washington Blvd. Bldg.
Frank Eurich, Jr., Detroit Bank Bldg.
C. R. Jensen, 3757 Gladstone Ave.
Lane-Davenport-Meyer, Donovan Bldg.
Lyndon & Smith, 13700 Woodward St.
McGrath & Dohmen, 2631 Woodward Ave.
Malcolmson, Calder & Hammond, Inc., 1217 Griswold St.
G. M. Merritt & Lyle S. Cole, 1111 Collingwood Ave.
H. Augustus O'Dell, Marquette Bldg.
C. William Palmer, 243 W. Congress St.
Edward A. Schilling, 409 Griswold St.
George L. W. Schulz, 19185 Bretton Drive
Smith, Hinchman & Grylls, Inc., Marquette Bldg.
N. Chester Sorensen Co., Industrial Bank Bldg.
Alex. Linn Trout, Penobscot Bldg.
B. C. Wetzel & Co., Dime Bank Bldg.

Flint
Bachman & Finster, Dryden Bldg.

Grand Rapids
Roger Allen, Grand Rapids National Bank Bldg.
John P. Baker, Watson Bldg.
Knecht, McCarty & Thebaud, Inc., Watson Bldg.
Henry H. Turner, 1620 Sherman St.

Ironwood
N. Albert Nelson, Suffolk St.

Kalamazoo
LeRoy & Newlander, Pratt Bldg.
Stewart-Kingscott Co., 208 Elm St.

Lansing
Lee Black & Kenneth C. Black, Capitol Savings & Loan Bldg.
Bowd-Munson Co., Wilson Bldg.
Warren S. Holmes Co., Olds Tower Bldg.

Marquette
David E. Anderson, 301 Nester Blk.

Menominee
Hubert & Gjelsteen, 1065 Sheridan Rd.

Mullett Lake
G. Harold Thompson

Port Huron
Walter H. Wyeth, Peoples Bank Bldg.

Royal Oak
Frank D. Madison, Wayne-Oakland Bank Bldg.

Saginaw
Samuel C. Allen, Eddy Bldg.
Frederick Beckbissinger, 304 Carroll St.
Robert Frantz and James B. Spence, 118 N. Washington St.
Donald A. Kimball, 2345 Delaware Blvd.
Clarence B. Merrill, Board of Commerce Bdg.

St. Johns
R. V. Gay, 1½ Clinton Ave.

Traverse City
Ralph L. Bauer, State Bank Bldg.

Wayne
Brender & Van Reyendam, 4624 Newberry St.

Ypsilanti
R. S. Gerganoff, 206 N. Washington St.

Minnesota

Albert Lea
LeRoy Gaarder, Hyde Bldg.

Austin
Allen H. Meinecke, 129 N. Main St.

Duluth
E. F. Broomhall, Box 472
Erickson & Co., 1911 E. 2nd St.
Giliuson & Ellingsen, Torrey Bldg.
A. Reinhold Melander, Phoenix Bldg.
Thomas J. Shefchik, Lonsdale Bldg.
C. H. Smith, Torrey Bldg.

Eveleth
Elwin H. Berg, 721 Summit St.

Fergus Falls
Foss & Co.

Hibbing
J. C. Taylor, 902 Minnesota St.

Mankato
Pass & Rockey, 124½ Jackson St.

Minneapolis
E. B. Croft, 1004 Marquette Ave.
Walter R. Dennis, 1108 Nicollette Ave.
E. H. Enger, Board of Education, 811 N. E. Broadway St.
C. W. Farnham, Wesley Temple Bldg.
Nairne W. Fisher, Builders Exchange
Haxby & Bissell, 1111 Nicollet Ave.
Jacobson & Jacobson, Sexton Bldg.
B. J. Knowles, Walker Bldg.
Lang & Raugland, Wesley Temple Bldg.
Larson & McLaren, Foshay Tower
Pesek & Shifflet, 914 Marquette Ave.
Edmund J. Prondzinski, Pence Bldg.

New Ulm
Albert G. Plagens, 300 N. State St.

Rochester
Harold H. Crawford, Box 1

St. Cloud
Frank W. Jackson, Granite Exchange Bldg.
Louis C. Pinault

St. Paul
William L. Alban, Endicott Bldg.
P. C. Bettenburg & Co., 1437 Marshall Ave.
Buechner & Orth, 1437 Marshall Ave.
Buetow & Olson, Buetow Bldg.
Eugene D. Corwin, Guardian Bldg.
Ellerbe & Co., First National Bank Bldg.
Ray R. Gauger & Co., 2635 University Ave.
Hausler & Fridlund, 490 N. Snelling St.
William M. Ingemann, Anchor Bldg.
Clarence H. Johnston, Empire Bank Bldg.
James C. Niemeyer, New York Bldg.
Eugene V. Schaefer, Shubert Bldg.
Slifer & Cone, Endicott Bldg.
Toltz, King & Day, Inc., Pioneer Bldg.

Thief River Falls
Henry C. Eckland & Co., Hartheren State Bldg.

Virginia
Paul S. Damberg, 212 Chestnut St.

Winona
Boyum, Schubert & Sorensen (also in La Crosse, Wis.)

Mississippi

Biloxi
John T. Collins, Fayard Bldg.

Greenwood
R. J. Moor, Box 507

Gulfport
Shaw & Woleben, Box 167
Smith & Norwood, Hewes Bldg.

Hattiesburg
T. Roscoe Hearon
Landry & Matthes, 218 W. Pine St.

Jackson
Fort & White, Deposit Guaranty Bank Bldg.
Hull & Drummond, Merchants Bank Bldg.
E. L. Malvaney, Millsaps Bldg.
R. W. Naef, 411½ E. Capitol St.
N. W. Overstreet, Standard Life Bldg.
James M. Spain, Deposit Guaranty Bldg.

McComb
J. Howard Ryan, Masonic Bldg.

Meridian
Krouse & Brasfield, Box 1065

Pascagoula
J. Warren McCleskey, Box 66

Starkville
Stevens & Johnston, Walker Bldg.

Missouri

Cape Girardeau
J. Carl Jourdan, Frederick St. & Broadway

Clayton
Hal. Lynch, 304 N. Central Ave.

Jefferson City
John M. Schaper, Central Trust Bldg.

Kansas City
Besecke, Swanson & Terney, Reliance Bldg.
Samuel W. Bihr, Jr., 912 Baltimore Ave.
Carroll & Dean, R. A. Long Bldg.
Edward M. Fuller, 1012 Baltimore Ave.
Frederick C. Gunn, National Fidelity Life Bldg.
Keene & Simpson, 15 W. 10th st.
Arthur Kriehn, 4638 Millcreek Parkway
H. D. Pampel, Finance Bldg.
Morton Payne & Russell Field, Inc., 845 W. 57th St.
Sayler & Owen, 1207 Grand Ave.
Joseph B. Shaughnessy and Alfred Berberg, Reliance Bldg.
Chas. A. Smith, Finance Bldg.
Wight & Wight, 14 W. 10 St.

Moberly
Ludwig Abt

St. Joseph
Walter Boschen, 517½ Francis St.
Eckel & Aldrich, Corby Bldg.
Everett Johns, Empire Trust Bldg.
Eugene R. Meier, Bartlett Bldg.

St. Louis
Macon A. Abbitt, 315 N. 7th St.
Baum & Froese, 3605 Laclede Ave.
Bonsack & Pearce, Inc., 408 Olive St.
Marcel Boulicault, Ambassador Bldg.
Ernest T. Friton & Associates, Security Bldg.
Hugo K. Graf, 2825 Olive St.
Henry P. Hess, 411 N. 7th St.
P. John Hoener, 3417 S. Kingshighway
Wm. B. Ittner, Inc., 911 Locust St.
Jamieson & Spearl, Arcade Bldg.
Otto J. Krieg, Wainwright Bldg.
La Beaume & Klein, 315 N. 7th St.
Murphy & Wischmeyer, 911 Locust St.
P. M. O'Meara & Associates, 5709 Waterman Ave.
O. W. Stiegemeyer, 4412 Lindell Blvd.

Springfield
Bruce Granger, Woodruff Bldg.
Earl Hawkins, McDaniel Bldg.
Johnson & Robinett, Landers Bldg.
Dan R. Sandford, Woodruff Bldg.

Montana

Billings
Chandler C. Cohagen, Hedden Bldg.
Cushing & Terrell, Box 1776
J. G. Link & Co., Electric Bldg.
Edwin G. Osness, 2714 10th Ave., N.
F. H. Palmer & Co., Box 1735
William H. Reid, Jr., 1140 N. 30th St.

Bozeman
Fred F. Willson, Box 497

Great Falls
Cottier & Herrington, First National Bank Bldg.
A. V. McIver, Strain Bldg.
George H. Shanley, First National Bldg.
J. van Teylingen, Medical Arts Bldg.

Helena

R. C. Hugenin, 440 N. Benton Ave. (also at 1201 W. Porphyry St., Butte)

Kalispell

Fred A. Brinkman, Whipps Block

Missoula

H. E. Kirkemo, Lehsou Block

Nebraska

Grand Island

Gordon Shattuck, Clinic Bldg.

Hastings

K. H. Gedney Company

Kearney

John P. Helleberg, 2302 Central Ave.
McClure & Walker, 2111½ Central Ave.

Lincoln

Fritz Craig, Stuart Bldg.
Davis & Wilson, Stuart Bldg.
N. Bruce Hazen, Stuart Bldg.
Meginnis & Schaumberg, Federal Securities Bldg.
J. F. Reynolds, 1637 S. 11th St.

Norfolk

E. B. Watson, 1107 Madison Ave.

North Platte

C. C. Coursey, Neville Bldg.

Omaha

N. R. Brigham, Keeline Bldg.
Everett S. Dodds, 6601 Florence Blvd.
Lahr & Stangel, W. O. W. Bldg.
John Latenser & Sons, Inc., 1307 Farnham St.
John & Alan McDonald, Standard Oil Bldg.
Chas. W. Steinbaugh, Brandeis Theatre Bldg.

Scottsbluff

O. J. Hehnke, Box 516.

Nevada

Reno

DeLongchamps & O'Brien, Gazette Bldg.
Russell Mills, 309 N. Virginia St.

New Hampshire

Durham

E. T. Huddleston, University of New Hampshire

Hanover

Jens Fredrick Larson
Wells, Hudson & Granger

Manchester

Wilfred E. Provost, 581 Union St.

Portsmouth

M. E. Witmer, 3 Congress St.

New Jersey

Camden

Byron H. Edwards, 708 Federal St.
Joseph Norman Hettel, 720 Federal St.
F. Herbert Radey, 101 N. 7th St.

Cliffside Park

Lucht & Anderson, 432 Palisade Ave.

Elizabeth

Leslie M. Dennis, 333 N. Broad St.
C. Godfrey Poggi, 287 Morris Ave.

Englewood

Lawrence C. Licht, 101 W. Palisade Ave.

Fort Lee

Hacker & Hacker

Hackensack

Arthur E. Doré, 332 River St.
George Nordham, 241 Main St.

Hazlet

Frederic Fessler, Holmdel Road

Irvington

Victor H. Strombach, 1243 Springfield Ave.

Jersey City

Hugh A. Kelly and Associates, 921 Bergen Ave. (also in Trenton)

Morristown

Arnold Voorhees Cook, 31 Park Place
Walter Slifer, 22 Elm St.

Newark

Behee & Krahmer, 27 Washington St.
C. Frederick Bertrand, 650 Broadway

New Brunswick

Alexander Merchant & Son, 1 Elm Row

Paterson

Elliott R. Coe, 26 Hamilton St.
Fanning & Shaw, 49 Ward St.
Lee & Hewitt, 152 Market St.
John C. Van Vlandren, 7 Smith St.

Perth Amboy

Aylin Pierson, 313 State St.

Plainfield

Ernest Thornell Brown, 201 E. 5th St.
Alfred M. Korff, 203 Park Ave.

Ridgefield

Thomas Watson, 569 Prospect Ave.

Rutherford

Huesmann & Osborne, 15 Orient Way

Trenton

Louis S. Kaplan, 33 W. State St.
Hugh A. Kelly and Associates, 219 E. Hanover St. (also in Jersey City)
Wm. W. Slack & Son, 1401 W. State St.

Union

Frederick A. Elsasser, 1000 Stuyvesant Ave.

Weehawken

Percie A. Vivarttas, 2214 Palisade Ave.

West New York

Frank J. Ricker-Louis A. Axt, 6115 Hudson Ave.

Woodbridge

Vincent J. Miller, 12 Crampton Ave.

New Mexico

Albuquerque

Brittelle & Ginner, K. of P. Bldg.
Louis G. Hesselden, 403 N. 12th St.

Clovis

Robert E. Merrell, Box 852
Jerry M. Schaefer, 1208 Pile St.

Roswell

C. R. Carr, 204½ N. Main St.
Voorhees & Standhardt

Santa Fe

Kruger & Clark, Box 1587
John Gaw Meem, Box 628
Gordon F. Street, 805 Allendale St.

Silver City

E. M. Kolben

New York

Albany

Andrew L. Delehanty, 450 Ontario St.
H. O. Fullerton, 152 Washington Ave.
Gander, Gander & Gander, 17 Steuben St.
Galen Nichols, 93 State St.
Office of Walter P. R. Pember, 24 James St.
J. Russell White, 109 State St.

Amsterdam

Howard F. Daly, 15 E. Main St.

Auburn

Wallace P. Beardsley, Seward Block

Binghamton

Conrad & Cummings, 99 Collier St.
A. T. Lacey & Sons, 52 Exchange St.
Walter H. Whitlock, 609 Chenango St.,

Brooklyn

Eric Kebbon, Supt. of School Bldgs., New York City, 49 Flatbush Ave. Extension
Henry V. Murphy, 1 Hanson Pl.

Buffalo

Bley & Lyman, 505 Delaware Ave.
Paul H. Harbach & James W. Kideney, 505 Franklin St.
Albert H. Hopkins, Liberty Bank Bldg.
F. J. & W. A. Kidd, 524 Franklin St.
Daniel G. McNeil, 333 North Dr.
Chester Oakley, 117 W. Tupper St.
Roswell E. Pfohl, 187 Niagara St.
Carl Schmill & Son, Prudential Bldg.

Elmira

Robert Turner Bickford, 215 W. Water St.
Haskell & Considine, Hulett Bldg.

Fayetteville

Gordon Wright, 315 E. Genesee St.

Forest Hills

A. Lawrence Kocher, 4 Park End Place

Glens Falls

Milton Lee Crandell, 200 Glen St.

Gloversville

W. Brown Van Dreser, 31 W. Fulton St.

Harrison

Robert P. Vignola, 231 Harrison Ave.

Herkimer

R. E. Sluyter, 203 N. Washington St.

Ithaca

Arthur N. Gibb, 302 E. State St.

Jamestown

Raymond A. Freeburg, 1105 W. 3rd St.
Oliver R. Johnson, Fenton Bldg.

Middletown

Robert R. Graham, 25 Prospect St.
E. P. Valkenburgh

Newburgh

Gordon S. Marvel, 216 Grand St.

New Rochelle

Edward J. Smith, Forest Heights

New York

Frederick L. Ackerman, 25 W. 44th St.
Adams & Prentice, 15 W. 38th St.
Arthur O. Angilly, 1 Madison Ave.
Grosvenor Atterbury, 139 E. 53rd St.
Wesley Sherwood Bessell, 25 W. 51st St.
William J. Boegel, 516 Fifth Ave.
Coffin & Coffin, 125 E. 46th St.
Corbett & MacMurray, 130 W. 42nd St.
Crow, Lewis & Wick, 200 5th Ave.
Eggers and Higgins, 542 Fifth Ave.
Aymar Embury, II, 150 E. 61st St.
Randolph Evans, 140 Nassau St.
Evans, Moore & Woodridge, 101 Park Ave.
William Gehron, 101 Park Ave.
Archibald F. Gilbert, 358 5th Ave.
Alfred Morten Githens and Francis Keally, 101 Park Ave.
William S. Gregory, 171 Madison Ave.
W. K. Harrison & J. A. Fouilhoux, 45 Rockefeller Plaza
William E. Haugaard, Commissioner, of Architecture, 80 Centre St.
Edward Shephard Hewitt, 32 E. 57th St.
Thomas H. Irving, 15 Park Row
Louis E. Jallade, 597 5th Ave.
A. H. Knappe & Associates, 192 Lexington Ave.
Archibald G. Lamont, 156 5th Ave.
B. Francis McGuire, 466 Lexington Ave.
Frederick Mathesius, 101 Park Ave.
McKim, Mead & White, 101 Park Ave.
Francis L. S. Mayers, 2 W. 47th St.
Daniel D. Merrill, 11 E. 44th St.
Moore & Hutchins, 11 East 44th St.
Morris & O'Connor, 101 Park Ave.
John Muller, 22 E. 40th St.
Frank J. & Sylvester W. A. Murphy, 280 W. 246th St.
Robert J. Reiley, 62 W. 45th St.
James Gamble Rogers, Inc., 156 E. 46th St.
Shreve, Lamb & Harmon, 11 E. 44th St.
Starrett & Van Vleck, 267 5th Ave.

Stearns & Stanton, 160 5th Ave.
Gustave E. Steinback, 101 Park Ave.
Tooker & Marsh, 101 Park Ave.
Office of Hobart Upjohn, Grand Central Terminal
Ides van der Gracht and Walter H. Kilham, Jr., 224 E. 49th St.
Theodore Visscher & James Burley, 51 E. 42nd St.
Voorhees, Walker, Foley & Smith, 101 Park Ave.
Franklin B. Ware, 1170 Broadway
Harold G. Webb, 101 Park Ave.
Albert Wilson & August J. Rahm, 140 E. 39th St.
York & Sawyer, 100 E. 42nd St.

Olean

A. W. E. Schoenberg

Rochester

Carl C. Ade, 52 James St.
Lewis J. Brew, 42 East Ave.
Charles A. Carpenter, 45 Exchange St.
Dryer & Dryer, 2550 East Ave.
William G. Kaelber and L. A. Waasdorp, 311 Alexander St.
George F. Lorenz, 3086 St. Paul Blvd.
Francis R. Scherer, 13 S. Fitzhugh St.
Smith & Stickney, 154 East Ave.

Rome

F. W. Kirkland, American Block

Southampton

Wm. I. LaFon, Jr., 48 Main St.

Syracuse

Paul Hueber, Starrett-Syracuse Bldg.
Melvin L. & Harry A. King, Denison Bldg.
Randall & Vedder, S. A. & K. Bldg.
D. Kenneth Sargent, Starrett-Syracuse Bldg.

Tarrytown

Geo. H. Martin, Jr., 15 E. Franklin St.

Troy

Frank J. Morgan, 253 Broadway

Utica

Bagg & Newkirk, 258 Genesee St.
Edward J. Berg, Berg Bldg.

Valley Stream

Frederic P. Wiedersum, 240 Rockaway Ave.

Watertown

Office of D. D. Kieff, C. of C. Bldg.
Albert M. Skinner, 228 Arsenal St.

West Hempstead

W. H. Spaulding, 22 Stevens Ave.

Wyandach

Hugo H. Avolin, Belmont Road

North Carolina

Asheboro

John James Croft, Jr., Barnes Bldg.

Asheville

S. Grant Alexander & Associates, 205 College St.
Henry Irven Gaines, Public Service Bldg.
Greene & Rogers, Arcade Bldg.
Lindsey M. Gudger, 52 Carter St.
Anthony Lord, 17½ Church St.

Belmont

F. Michael McInerney, Belmont Abbey

Charlotte

Louis H. Asbury, Commercial Bank Bldg.
Chas. W. Connelly, Builders Bldg.
Walter W. Hook, Commercial Bldg.

Durham

Atwood & Weeks, Inc.
George Watts Carr, 111 Corcoran St.
R. R. Markley, Box 184

Elkin

J. M. Franklin, Box 28

Goldsboro

A. J. Maxwell, Jr., Borden Bldg.

Greensboro

W. L. Brewer, Dixie Bldg.
Charles C. Hartman, Jefferson Bldg.
Leon McMinn, Southeastern Bldg.
Albert C. Woodroof, Jefferson Bldg.

Henderson

Eric G. Flannagan, McCoin Bldg.

Hendersonville

Erle G. Stillwell

Hickory

Robt. L. Clemmer, Grant Bldg.
Q. E. Herman

High Point

Louis F. Voorhees & Eccles D. Everhart, 308½ N. Main St.

Leaksville

James W. Hopper

Lenoir

Clarence P. Coffey, Box 368

Louisburg

M. Stuart Davis

Monroe

I. J. Tucker, Wadesboro Rd.

Raleigh

Wm. Henley Deitrick, 115 W. Morgan St.
Ross Shumaker, 2702 Rosedale Ave.
Frank B. Simpson, Shepherd Bldg.

Rocky Mount

Harry J. Harles, Municipal Bldg.

Shelby

Breeze & Rivers, Lineberger Bldg.

Statesville

Roger C. McCarl, Stearns Bldg.

Wilmington

Lynch & Foard, 202½ Princess St.

Wilson

Frank W. Benton, Municipal Bldg.
Thomas B. Herman, 117 W. Nash St.

Winston Salem

Harold Macklin, 620½ W. 4th St.
Northup & O'Brien, Reynolds Bldg.
William Roy Wallace, Reynolds Bldg.

North Dakota

Bismarck

Ritterbush Bros., 209 7th St.

Devil's Lake

John Marshall, 205 5th St.

Fargo

Braseth & Houkom, 716 S. 7th St.
Hansen & Henning, Department of Architecture, North Dakota Agricultural College
Knute A. Henning, 1103 N. 2nd St.
William F. Kurke, 1117 13th Ave., N.

Grand Forks

Jos. Bell De Remer
Theodore B. Wells

Jamestown

Gilbert R. Horton, Box 1217

Mandon

Nick Ressler, 211 2nd Ave., N.E. (also at Bismarck)

Minot

G. H. Bugenhagen
E. W. Molander, First Avenue Bldg.

Ohio

Akron

Leroy W. Henry, 247 E. Exchange St.
M. M. Konarski, 1100 Merriman Rd.
Milton E. Murphy, Board of Education, 70 N. Broadway
William Boyd Huff, 34 S. High St.
M. P. Lauer, 31 N. Summit St.

Ashtabula

Clarence V. Martin, Johnson Bldg.

Athens

Wm. J. Davis, Security Bank Bldg.
Thomas Larrick, 78 Mill St.

Berea

Mellenbrook, Foley & Scott, 26 Front St.

Bowling Green

S. P. Stewart & Son, 135 W. Wooster St.

Canton

Charles E. Firestone & Laurence J. Motter, 1412 Cleveland Ave., N.W.
Harry C. Frank, Canton Bldg.

Cincinnati

Charles Frederick Cellarius, St. Paul Bldg.
Frederick W. Garber, 616 Walnut St.
Grunkemeyer & Sullivan, 3717 Eastern Ave.
Hunt & Allan, 914 Main St.
E. C. & G. T. Landberg, 114 Garfield Pl.
Howard Muesse, American Bldg.
Potter, Tyler & Martin, 35 East Seventh St.
C. C. & S. K. Weber, St. Paul Bldg.

Cleveland

Walter G. Caldwell, Engineers Bldg.
Junior W. Everhard, 9219 Clifton Blvd.
George Fox, Union Commerce Bldg.
Fulton & McCreary, 5716 Euclid Ave.
Herman Kregelius, Commissioner of Architecture, City Hall
Small, Smith & Reeb, Terminal Tower
The George S. Rider Co., Terminal Tower
James William Thomas, 3868 Carnegie Ave.
Walker & Weeks, 2341 Carnegie Ave.
Warner & Mitchell, Bulkley Bldg.

Cleveland Heights

William Koehl, Mayfield & Lee Blvd.

Columbus

John Quincy Adams, 53-55 Lexington Ave.
E. W. Austin, 17 S. High St.
Fred Fornoff, 55 E. State St.
F. F. Glass, 20 S. 3rd St.
Harsh & Davies, 145 N. High St.
Edward Kromer, Board of Education, 270 E. State St.
Richards, McCarty & Bulford, 584 E. Broad St.
Robert B. Schildknech, State Architect, Ohio Dept's Bldg.
Howard Dwight Smith
Claude W. Youst, 55 E. State St.

Coshocton

Fred D. Jacobs, 514 Main St.

Dayton

Rial T. Parrish, 127 Cambridge Ave.
Walter A. Rabold, 341 Elmhurst Rd.
Walker, Norwick & Templin, American Bldg.

Defiance

Philip T. Sherman, 650 W. First St.

East Liverpool

Robert F. Beatty, Potters Savings & Loan Bldg.

Elyria

Silsbee & Smith, Turner Bldg.

Forest

Burk & Seebach, Warner St.

Fremont

C. H. Shively, 400½ Croghan St.

Grand Rapids

W. Howard Manor, E. Main St.

Hamilton

Geo. Barkman, 20 N. 6th St.

Lancaster

Ralph E. Crook, 1027 E. Fifth Ave.

Lima

Peter M. Hulsken—Lyman T. Strong, Associate, 218 W. Market St.
Thomas D. McLaughlin & Associates, Dominion Bldg.

Mansfield
Althouse & Jones, Farmers Bank Bldg.
Harry J. Brumenshenkel, 13 Park Ave., W.
Vernon Redding & Associates, Walpark Bldg.

Marion
Moore & Denman, 132 E. Center St.

Nelsonville
William Mills & Son

Newark
Merle T. Orr, 77 Granville St.

New Philadelphia
Charles J. Marr, N. Broadway

Norwalk
Granville E. Scott, Citizens Bank Bldg.

Portsmouth
Devoss & Donaldson, National Bank Bldg.

Sandusky
Harold Parker, 230 E. Market St.

Sidney
F. E. Freytag, Orbison Hill

Steubenville
Fred H. Clarke, National Exchange Bank Bldg.

Tiffin
Troxel & Fernald, Laird Bldg.

Toledo
Britsch & Munger, Nicholas Bldg.
Gerow & Conklin, Spitzer Bldg.
Hahn & Hayes, 723 Ontario St.
Jokel-Coy-Thal, 320 Ontario St.
Mills, Rhines, Bellman & Nordhoff, Inc., 518 Jefferson Ave.

Warren
Keich & O'Brien, Union Bank Bldg.

Wooster
R. A. Curry, 127½ E. Liberty St.

Youngstown
Myron N. Goodwin, Union National Bank Bldg.
O. J. Kling, 100 E. Rayen Ave.
Randall Medicus, Home Savings & Loan Bldg.

Oklahoma

Ada
Robert F. Ferguson, 100½ E. Main St.
Albert S. Ross, Cummings Bldg.

Ardmore
Harold F. Flood, Gilbert Bldg.
J. B. White & Son, Gilbert Bldg.

Chickasha
Paul Harris, 1503 S. 19th St.

Enid
R. W. Shaw, Bass Bldg.

Kingfisher
Henry C. Jackson, Box 394

Muskogee
J. J. Haralson, Manhattan Bldg.
H. H. Niemann, 1155 Summit St.

Norman
Joe E. Smay, University of Oklahoma

Oklahoma City
Leonard H. Bailey, Colcord Bldg.
Forrest Butler, Terminal Bldg.
Jos. I. Davis, 6631 Avondale Ave.
Dennis E. Donovan, 618 N.W. 23rd St.
John C. Hope, First National Bldg.
Malcolm Moore & Ed. Hudgins, Cotton Exchange Bldg.
Parr, Frye & Aderhold, Hales Bldg.
Peyton Smith, 517 N.W. 40th St.
Sorey, Hill & Sorey, First National Bldg.
Tonini & Bramblet, 30 N.W. 14th St.
Walter T. Vahlberg, Hightower Bldg.
Winkler & Reid, Oklahoma Savings Bldg.

Ponca City
G. J. Cannon

Shawnee
Hugh W. Brown, Jr., Petroleum Bldg.
A. C. Davis & Sons, 432 N. Broadway

Spavinaw
A. J. Love & Co.

Stillwater
Philip A. Wilber, 315 Knoblock St.

Tulsa
A. M. Atkinson, Thompson Bldg.
Ralph M. Black, Kennedy Bldg.
John O. Bradley, Robinson Bldg.
Frederick Vance Kerschner, 2503 E. 21st St.
Koberling & Fleming, 1400 S. Boston Ave.
Leon B. Senter, Philtower Bldg.
Frank C. Walter, Midco Bldg.

Oregon

Eugene
John Laurin Reynolds, 841 Willamette St.
Graham B. Smith, Register-Guard Bldg.

Klamath Falls
Howard R. Perrin, Underwood Bldg.

Medford
Clark & Keenan, Fluhrer Bldg.
William Laing, U. S. National Bank Bldg.

Portland
J. D. Annand, 512 N. W. 12th Ave.
Barrett & Logan, 1940 S. W. 4th Ave.
John V. Bennes, Lewis Bldg.
L. L. Dougan, 1326 S.W. Columbia St.
A. E. Doyle & Associates, Pacific Bldg.
C. N. Freeman, Postal Bldg.
Francis B. Jacobberger, McKay Bldg.
Hollis Johnston, Pittock Bldg.
Jones and Marsh, Woodlark Bldg.
Knighton & Howell, Guardian Bldg.
Lawrence, Holford & Allyn, Failing Bldg.
Truman E. Phillips, Pearson-Fourth Ave. Bldg.
Roald & Schneider, 319 W. Washington St.
A. Glenn Stanton, Railway Exchange Bldg.
F. Marion Stokes, Terminal Sales Bldg.

Salem
Lyle P. Bartholemew, U. S. National Bank Bldg.
Frederick H. Eley, 590 N. 15th St.

Pennsylvania

Allentown
H. F. Everett & Associates, Commonwealth Bldg.
Ruhe & Lange, 12 N. 6th St.
George E. Yundt, 16 S. 6th St.

Altoona
Hunter & Caldwell, 3601 Fifth Ave.

Bradford
Thomas K. Hendryx, Box 213

Charleroi
Alan C. Brenton, First National Bank Bldg.

Donora
C. & E. E. Compton, 4th St. and Thompson Ave.

Doylestown
A. Oscar Martin & Son, Hart Bldg.

Du Bois
Hugh A. Daly, Forest Ave.
Russell G. Howard, Deposit Bank Bldg

Ellwood City
B. J. McCandless, 239 4th St.

Erie
Geo. E. Eichenlaub, Commerce Bldg.
Fred A. Fuller, Commerce Bldg.
Clement S. Kirby, Commerce Bldg.
Meyers & Johnson, Commerce Bldg.
G. W. Stickle, Commerce Bldg.

Esterly
Elmer H. Adams

Greensburg
C. H. Sorber, First National Bank Bldg

Harrisburg
Frank M. Highberger, 600 N. Second St.
Lappley & Hornbostel, Riverview Manor
Lawrie & Green, 111 S. Front St.
James W. Minick, 503 N. Second St.
Wm. Lynch Murray, 1100 N. Second St.
B. E. Starr, 7 S. Second St.
Joseph Lesher Steele, 23 N. Third St.

Hazleton
Harry B. Lentz, Traders Bank

Homestead
Adam G. Wickerham, 135 E. 8th Ave.

Johnstown
Horace A. Bailey, U. S. Bank Bldg.
H. B. Raffensperger, Johnstown Trust Bldg.
Henry M. Rogers, Johnstown Bank & Trust Bldg.

Kittanning
Tillman Scheeren, Jr., Boarts Bldg.

Lake Ariel
Floyd A. Chapman

Lancaster
Henry Y. Shaub, 20½ N. Queen St.
Ross W. Singleton, Woolworth Bldg.

Lewisburg
Malcolm A. Clinger, N. Second St.

McKeesport
Charles R. Moffitt, Masonic Temple Bldg.

Meadville
D. Fuller Stewart, 784½ Kennedy St.

Monessen
H. Ernest Clark, 725 Second St.

Montgomery
E. J. Kosier, 71 Melvina St.

Mount Carmel
Henry J. Socoloskie, 310 S. Hickory St.

Nanticoke
Geo. P. McLane, Woolworth Bldg.

New Castle
W. G. Eckles Co., Lawrence Savings & Trust Bldg.
The Thayer Co., Greer Bldg.

Norristown
Henry Gordon McMurtrie, Airy & Stanbridge Sts.

Oil City
Holmes Crosby

Philadelphia
Arthur H. Brockie, Architects Bldg.
Horace W. Castor, Architects Bldg.
Paul P. Cret, Architects Bldg.
Henry D. Dagit & Sons, 1329 Race St.
Davis & Dunlap, 1717 Sansom St.
Earley & Tobiessen, 262 S. 17th St.
Peter F. Getz, Hardt Bldg.
Gondos & Gondos, Architects Bldg.
Frank E. Hahn, Inc., 1700 Walnut St.
Joseph Linden Heacock, 1211 Chestnut St.
Walter T. Karcher & Livingston Smith, 1520 Locust St.
W. R. Morton Keast, Commonwealth Bldg.
Fiske Kimball, Lemon Hill, Fairmount Park
The Office of Charles Z. Klauder, 1429 Walnut St.
W. H. Lee, 1505 Race St.
MacKenzie & Blew, Otis Bldg.
Paul Monaghan, 1520 Locust St.
G. W. Pepper, Jr., 1600 Walnut St.
Purves, Cope & Stewart, Architects Bldg.
Savery, Scheetz & Gilmour, 21 S. 12th St.
Howell Lewis Shay, Packard Bldg.
Thomas & Martin, Architects Bldg.

Office of Horace Trumbauer, Julian F. Abele & William O. Frank, Land Title Bldg.
Wallace & Warner, Girard Trust Bldg.
Wenner & Fink, 1701 Arch St.
Stanley Yocom, Board of Public Education, Parkway at 21st St.

Pittsburgh

Ackley, Bradley, & Day, 508 Third Ave.
Francis A. Berner, 1512 Froman St.
W. M. Braziell, 323 4th Ave.
Carlisle & Sharrer, Martin Bldg.
Press C. Dowler, Century Bldg.
Joseph Hoover, Keystone Bldg.
J. Lawrence Hopp, 508 3rd Ave.
William P. Hutchins, Empire Bldg.
Ingham & Boyd, Empire Bldg.
Richard Irvin, 508 3rd Ave.
Marshall Gardner Lindsay, 164 Hallock St.
Raymond M. Marlier, Empire Bldg.
Leo A. McMullen, Renshaw Bldg.
Casimir J. Pellegrini, Keenan Bldg.
William Richard Perry, 2882 W. Liberty Ave.
John H. Phillips, Wabash Bldg.
Prack & Prack, 119 Federal St., N. S.
A. Pyzdrowski, 3410 Fleetwood St.
M. M. Steen, Bellefield Ave. at Forbes

Pottsville

Philip G. Knobloch—D. H. Grootenboer, 1811 W. Market St.

Reading

G. C. Freeman, 419 Carsonia Ave.
Wayne M. High & Sons, 230 N. Sixth St.
W. Marshall Hughes, 147 N. 5th St.
Muhlenberg, Yerkes & Muhlenberg, Ganster Bldg.
Ritcher & Eiler, 147 N. 5th St.
Edward Z. Schall, 136 Robeson St.

Sayre

Harry C. Child, 501-503 S. Keystone Ave.

Scranton

Coon & Barrett, Scranton National Bank Bldg.
Davis & Lewis, Scranton Electric Bldg.
Hancock & Willson, Mears Bldg.

Sharon

E. E. Clepper, 72 Vine Ave.

State College

Dean E. Kennedy, S. Atherton St.

Stroudsburg

Rinker & Kiefer

Sunbury

Davis & Rice, 4th & Chestnut Sts.

Uniontown

H. W. Altman, Fayette Title & Trust Bldg.

Washington

S. Lloyd Beall, Washington Trust Bldg.
C. Garey Dickson, Court Office Bldg.

Wilkes-Barre

Office of Thos. A. Foster, Brooks Bldg.
Ralph M. Herr, 140 S. Main St.
Fred J. Mack, 22 N. Franklin St.
Austin L. Reilly, Bennett Bldg.

Wilkinsburg

Walter E. Schardt, 811 Pitt St.

Williamsport

W. D. Shollenberger, 13½ W. Fourth St.
R. Douglas Steele, 34 W. 4th St.
Clarence Wagner, 133 W. 4th St.

York

Office of John B. Hamme, 31 W. Market St.
Harry R. Lenker, Schmidt Bldg.

Rhode Island

Pawtucket

Albert H. Humes, 332 Main St.

Providence

Edward O. Ekman, 72 Weybosset St.
Albert Harkness, Industrial Trust Bldg.
Jackson, Robertson & Adams, Turks Head Bldg.
Harry L. Meacham Associates, 58 Weybosset St.
B. G. V. Zetterstrom, Public Buildings Department, City Hall

Woonsocket

Walter F. Fontaine, Inc., 285 Main St.

South Carolina

Anderson

Charles Wm. Fant, 109½ Sharpe St.

Bennettsville

H. D. Harrall, 717 W. Main St.

Charleston

David B. Hyer, Peoples Bldg.
Simons & Lapham, 7 State St.

Columbia

Wessinger & Johnson, Ritz Bldg.

Florence

Hopkins & Baker, Trust Bldg.

Greenville

Cunningham & Walker, 108 E. Washington St.
J. E. Sirrine & Co., 215 S. Main St.

Lancaster

Julian S. Starr, Box 143

Rock Hill

A. D. Gilchrist

Spartanburg

L. D. Proffitt, 110½ Kennedy St.
W. Paul Williams, Harris Bldg.

South Dakota

Aberdeen

J. W. Henry, First National Bank Bldg.
Roland R. Wilcken, Citizens Bldg.

Mitchell

Walter J. Dixon, Medical Arts Bldg.

Rapid City

Chenoweth & Forrette
James C. Ewing, 609½ Main St.

Sioux Falls

Hugill & Blatherwick, Boyce Greeley Bldg.
Perkins & McWayne, Paulton Bldg.
Harold Spitznagel, Western Surety Bldg.

Tennessee

Bristol

R. V. Arnold, 602 Shelby St.

Chattanooga

Wm. Crutchfield & H. G. Law, 809 Pine St.
Selmon T. Franklin, Chattanooga Bank Bldg.
R. H. Hunt Co., Chattanooga Bank Bldg.
Arthur E. Nimitz, 508 E. View Drive
W. H. Sears & P. B. Shepherd, James Bldg.
Gordon L. Smith, Volunteer Bldg.

Clarksville

Speight & Hibbs, Public Square

Johnson City

D. R. Beeson, Sells Bldg.
Leland K. Cardwell

Kingsport

Allen N. Dryden, 209 E. Market St.

Knoxville

Barber & McMurry, 517½ W. Church Ave.
Barber & Shelton, 722½ Market St.
Fred Manley, Empire Bldg.

Memphis

George Awsumb, 1792 Forrest Ave.
Furbringer & Ehrman, Union Planters Bank Bldg.
Hanker & Heyer, Commerce Title Bldg.
Geo. Mahan, Sterick Bldg.
Estes W. Mann, Shrine Bldg.
Walter R. Nelson, 2115 Monroe Ave.
Regan & Weller, Commerce-Title Bldg.

Nashville

O. J. Billis, 66 Arcade St.
Dougherty & Clemmons, Third National Bank Bldg.
Thos. W. Gardner, Amer. Trust Bldg.
Hart, Freeland & Roberts, Third National Bank Bldg.
Hart & Russell, Third National Bank Bldg.
Henry C. Hibbs
Granbery Jackson, Jr., Vendome Bldg.
Marr & Holman, Stahlman Bldg.
McKissack & McKissack, Morris Memorial Bldg.
J. Clyde Seale, Third National Bank Bldg.
Donald W. Southgate, Nashville Trust Bldg.
Eli M. Tisdale, Warner Bldg.
George D. Waller, Third National Bank Bldg.
Office of Emmons H. Woolwine, American Trust Bldg.

Texas

Abilene

Fred Buford & Company, Alexander Bldg.
David S. Castle Co., 1082½ N. First St.
C. R. Gaskill, Jr., Alexander Bldg.

Alice

Waldo Foster, Drawer 1210

Alpine

Victor J. Smith, 906 College Ave.

Amarillo

Macon O. Carder, Fisk Bldg.
Guy A. Carlander, Box 3158
Emmett F. Rittenberry & Son, Fisk Bldg.
Townes & Funk, 1208 W. 10th St.

Austin

Driscoll & Groos, 801 Park Place
Giesecke & Harris, 207 W. 7th St.
Bubi Jessen & Wolf Jessen, 112 E. 9th St.
H. F. Kuehne, Littlefield Bldg.
C. H. Page & Son, 207 W. 7th St.
Page & Southerland, 121 E. 7th St.
Shingle & Scott, Littlefield Bldg.
Robert Leon White, University of Texas

Beaumont

Wallace B. Livesay, Box 2228
Steinman & Golemon, Liberty Bldg.
Stone & Pitts, Goodhue Bldg.
N. E. Wiedemann, American National Bank Bldg.

Brenham

Travis Broesche

Brownsville

C. Lyman Ellis & Co., Merchants Bank Bldg.

Cameron

J. E. Johnson, Cameron Hotel

Corpus Christi

Brock, Roberts & Anderson, Jones Bldg.
Hamon & Co., Jones Bldg.
Nat W. Hardy, Nixon Bldg.
Morris L. Levy, Med. Prof. Bldg.
R. L. Vogler—G. G. Decker
Westfall & Wade, Nixon Bldg.

Corsicana

Blanding & Horn, Mays Bldg.

Dallas

Arthur A. Brown, Texas Bank Bldg.
Ralph Bryan, Construction Bldg.
Curtis & Newberry, Burt Bldg.
Eugene Davis, Liberty Bank Bldg.
DeWitt & Washburn, Praetorian Bldg.
Flint & Broad, Burt Bldg.
Lang & Witchell, First National Bank Bldg.
La Roche & Dahl, Southland Life Annex
C. H. Leinbach & Bro., Slaughter Bldg.
Mark Lemmon, Tower Petroleum Bldg.
Maurice Peterman, 5230 Monticello St.
Walter C. Sharp, Construction Bldg.
Arthur E. Thomas, Construction Bldg.

(*Continued on page 603*)

SECTION IV
OPERATION AND MAINTENANCE

SMALL-SCHOOL OPERATION AND MAINTENANCE

By WALTER McLAIN

Secretary, Board of Education, Ottumwa, Iowa

OTTUMWA is just a small town that has continued to grow up, until it has reached the realization that today it is actually a small city.

As it has grown, now and then a new school has been built, the educational program has developed, and a technique has been gained in running affairs. The text of our study of trial and error will be taken from what it costs to maintain the schools for a better program as time sweeps along.

The Factor of Costs

In order to conserve as much as possible for the all-important task of education itself, Ottumwa's Board of Education and administrating officers, conscious of their obligation to the community's young people who are learning to be citizens, are naturally concerned in keeping down running expenses in all school departments where there are fluctuating possibilities. Opportunities can be watched and made use of in everyday affairs, and certainly in better management of the custodian service, fuel, light, power, wear and tear, of the school properties, so that a little more may be spared for better instruction and its auxiliary features.

Operation in itself takes 11 per cent of the total running expenses of Ottumwa's schools. In terms of what this means per pupil, it costs $8.60 a year to keep the buildings and grounds neat and clean, warm and lighted, and to maintain the other services for clear sailing of the teaching staff.

Investment in Custodians

Three-fourths of the 11 per cent spent for the operation of the Ottumwa school district goes to pay the force of custodians. A long time ago, the manpower of the system joined forces with the school directors and administrative heads to improve their status. They formed an organization to meet once or twice a month at night in their buildings and talk over their problems, and occasionally to bring in outside speakers who would tell them how they could improve their housekeeping and general usefulness. Gradually they learned to do their work a little better. Then they were sent to a special training school at the state agricultural college at Ames. Practically the entire staff has now completed a four-year extension course in housekeeping, and last summer they went back again for four intensive days and evenings, some to take advanced work in plumbing and heating, others to complete the other branch, housekeeping. Not only this, but the maintenance heads go either to Minneapolis or the Kansas school each summer, where, with many others over the country, they find out new ways in operation and maintenance management, so that when at home again they can keep from doing everything in the same old way.

Needless to say, with limited funds for the school budget, long hours are necessary in the winter months in a typical school building where one custodian is the "jack of all trades." He must reach his building before daylight to get the rooms warm and the building ready for the hundreds of children tramping in and out. Twelve hours a day is not uncommon for the custodians in most of Ottumwa's elementary schools. We hope to make this nearer eight hours by some plan for relief help in the late afternoon. In the junior and senior high school, where more help is available, a little more specialization is possible, and the whistle blowing means more here. During the summer months a 40-hour week helps to compensate for the nine long winter months in this middle-west cold climate.

Custodian salaries are intended to be a fair wage that will enable a custodian to raise his family and provide them a good living. Large-building custodians in Ottumwa receive $131 a month the year round. They are in charge of schools with from twelve to fifteen classrooms, buildings with 20,000 to 30,000 square feet of floor surface to keep clean. Buildings with from nine to twelve rooms are in the

Experienced custodians at work laying a new floor

next salary class, $110 to $121 a month, while several smaller schools range between $63 and $110 monthly. High-school custodians with a regular routine of duties, but not including firing, are paid a salary of $110 a month, firemen $126 with longer shifts per day.

As in many other districts, custodians receive two weeks vacation with full pay in the summer, get up to ten days sick allowance annually, and are allowed time off when death occurs in their families.

Custodians are directly responsible to the principal of their school and to the building superintendent for the faithful performance of their duties. A carefully detailed set of rules and regulations govern them in all their work, rules that have come about from actual practice. From time to time, revisions are made in these prescribed rules. Very little friction develops from this practice.

Keeping Operating Costs at a Minimum

One of the most important things about the running of Ottumwa's schools is the willingness of all to co-operate in striving to keep down operating costs. While it is easy to forget for a little while that strong lights are burning in classrooms while sunshine pours in at the windows when it is not too warm to draw the shades, for the most part everyone is conscious of what it costs to run the lights.

Stokers and boilers get their summer overhauling

Custodians paint school corridors

At periodical intervals, reports are furnished all principals and their custodians as to how much it is costing for all items of their budget. They are interested in seeing that light, water, and other things are not wasted. They check meter readings, try to keep down the cost of their supplies, and do their part in general.

Fuel cost averages a dollar a pupil a year, and light and power run about the same. Expressed in terms of the total amount spent in the system, this is 1½ per cent for each item for the fourteen schools. Light and power rates have been slightly reduced to compensate for much more improved lighting of classrooms during recent years. Fuel costs are down to about half of what they were a few years ago. Custodians have learned better firing methods. Added to this, a better quality of coal is now being used, coal purchased and paid for on a prorating basis if not up to the standard of value as contracted for at the start of the heating season. Stokers are in operation at most of the schools, all burning Iowa screenings, or, in the case of bunker type stokers, special stoker coal.

Fuel is sampled at intervals during the heating season and discounted in per cent of contract price regardless of grade on monthly payments following chemical analyses, and continued until later proved to be better than the proration.

Building cupboards in school shops

Grading a hill into an athletic field

Along with the advance from small-town elementary schools built forty to fifty years ago, Ottumwa school people a few years ago completed a program of modernizing lighting in classrooms and corridors, special rooms, shops, etc. At one time, in many cases these were single drops. Now there are separately controlled batteries of lights, 10 foot-candles or better on classroom desks, a far cry from conditions ten years ago.

For this service a combined average rate of 3.4 cents prevails, or on light alone 4.2 cents, and on power for machinery 2.8 cents, not perhaps quite low enough, but a fair price for indispensable service at least.

Maintenance

Early in the spring the principals, custodians, and maintenance heads get together on their proposed program of repairs for the coming year. Some of these things may have been asked for last year or the year before that, and have been sliced off for lack of funds. Perhaps they may be new improvements occasioned by more demands, opening of additional classrooms or improved services.

After these lists are prepared, cost estimates are made for them, totals arrived at for each property, and the grand total for the system. Since just about so much is available every year for maintenance—a

Better seating facilities replace old style bolted-down desks

Tearing down a grade school to make room for a modern building

figure that always seems to be slightly under the normal depreciation of nearly 3 per cent a year, everyone knows that something may have to be put off at every school until the need is greater next year.

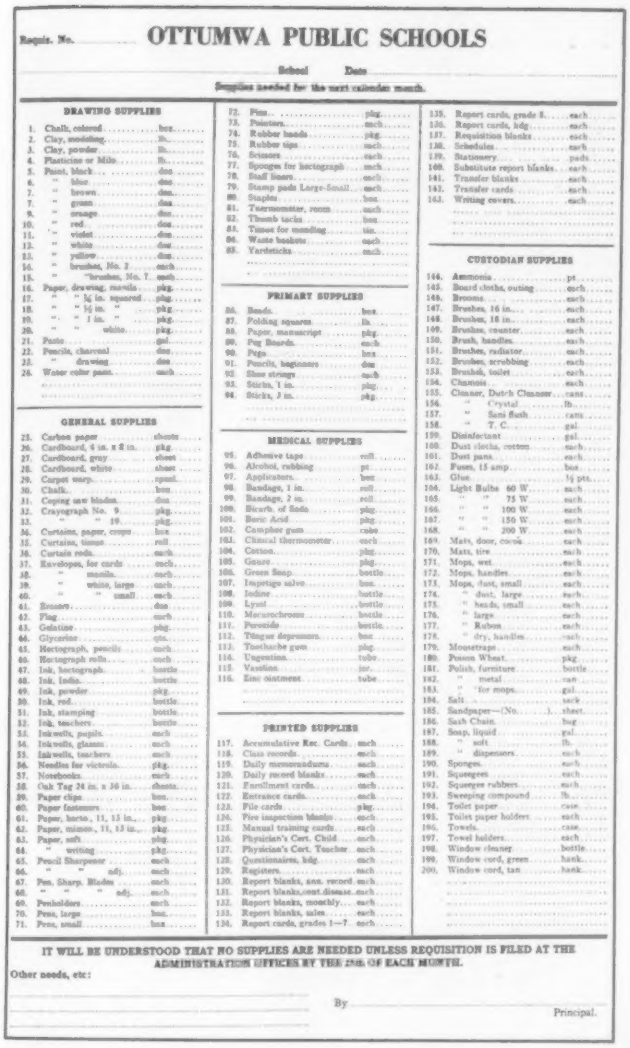
Later in the spring, the Board of Education, with the Superintendent of Schools and the maintenance heads, spend an entire day visiting and seeing at first hand the needed repairs and replacements, talking over these things with principals, teachers, custodians, and all others concerned. In this way, many viewpoints and ideas are exchanged, so that, later on, the Board sits down to view the system as a whole and pass on as much of a program as is possible with the funds that are to be available.

Repairs Get Under Way

Then bids on materials, alterations, and equipment follow, so that work can begin shortly after school closes. Some work that does not interfere with regular classes is started before school is out. The first week after schools close, custodians in the grades get the boilers cleaned out ready for insurance company inspection.

Next come two major problems handled by the custodian staff each summer—interior painting, and laying new floors. Buildings are painted inside every five to six years with ready-mixed paint, semi-gloss. One custodian serves as foreman of this work under

An unused corner takes life for a hot-lunch project



Requis. No. .... OTTUMWA PUBLIC SCHOOLS

.... School Date ....

Supplies needed for the next calendar month.

DRAWING SUPPLIES

1.	Chalk, colored	box
2.	Clay, modeling	lb.
3.	Clay, powder	lb.
4.	Plasticine or Milo	lb.
5.	Paint, black	doz
6.	" blue	doz
7.	" brown	doz
8.	" green	doz
9.	" orange	doz
10.	" red	doz
11.	" violet	doz
12.	" white	doz
13.	" yellow	doz
14.	" brushes, No. 2	each
15.	" "brushes, No. 7	each
16.	Paper, drawing, manila	pkg.
17.	" " ¼ in. squared	pkg.
18.	" " ½ in. "	pkg.
19.	" " 1 in. "	pkg.
20.	" " white	pkg.
21.	Paste	gal.
22.	Pencils, charcoal	doz
23.	" drawing	doz
24.	Water color pans	each

GENERAL SUPPLIES

25.	Carbon paper	sheets
26.	Cardboard, 4 in. x 8 in.	pkg.
27.	Cardboard, gray	sheet
28.	Cardboard, white	sheet
29.	Carpet warp	spool
30.	Chalk	box
31.	Coping saw blades	doz
32.	Crayograph No. 9	pkg.
33.	" " 19	pkg.
34.	Curtains, paper, crepe	box
35.	Curtains, tissue	roll
36.	Curtain rods	each
37.	Envelopes, for cards	each
38.	" manila	each
39.	" white, large	each
40.	" " small	each
41.	Erasers	doz
42.	Flag	each
43.	Gelatine	pkg.
44.	Glycerine	qts.
45.	Hectograph, pencils	each
46.	Hectograph rolls	each
47.	Ink, hectograph	bottle
48.	Ink, India	bottle
49.	Ink, powder	pkg.
50.	Ink, red	bottle
51.	Ink, stamping	bottle
52.	Ink, teachers	bottle
53.	Inkwells, pupils	each
54.	Inkwells, glasses	each
55.	Inkwells, teachers	each
56.	Needles for victrola	pkg.
57.	Notebooks	each
58.	Oak Tag 24 in. x 36 in.	sheets
59.	Paper clips	box
60.	Paper fasteners	box
61.	Paper, hecto., 11, 13 in.	pkg.
62.	Paper, mimeo., 11, 13 in.	pkg.
63.	Paper, soft	pkg.
64.	" writing	pkg.
65.	Pencil Sharpener	each
66.	" " adj.	each
67.	Pen. Sharp. Blades	each
68.	" " " adj.	each
69.	Penholders	each
70.	Pens, large	box
71.	Pens, small	box
72.	Pins	pkg.
73.	Pointers	each
74.	Rubber bands	pkg.
75.	Rubber tips	each
76.	Scissors	each
77.	Sponges for hectograph	each
78.	Staff liners	each
79.	Stamp pads Large-Small	each
80.	Staples	box
81.	Thermometer, room	each
82.	Thumb tacks	box
83.	Tissue for mending	tin
84.	Waste baskets	each
85.	Yardsticks	each

PRIMARY SUPPLIES

86.	Beads	box
87.	Folding squares	lb.
88.	Paper, manuscript	pkg.
89.	Peg Boards	each
90.	Pegs	box
91.	Pencils, beginners	doz
92.	Shoe strings	each
93.	Sticks, 1 in.	pkg.
94.	Sticks, 3 in.	pkg.

MEDICAL SUPPLIES

95.	Adhesive tape	roll
96.	Alcohol, rubbing	pt
97.	Applicators	box
98.	Bandage, 1 in.	roll
99.	Bandage, 2 in.	roll
100.	Bicarb. of Soda	pkg.
101.	Boric Acid	pkg.
102.	Camphor gum	cake
103.	Clinical thermometer	each
104.	Cotton	pkg.
105.	Gauze	pkg.
106.	Green Soap	bottle
107.	Impetigo salve	box
108.	Iodine	bottle
109.	Lysol	bottle
110.	Mecurochrome	bottle
111.	Peroxide	bottle
112.	Tongue depressors	box
113.	Toothache gum	pkg.
114.	Ungentine	tube
115.	Vaseline	jar.
116.	Zinc ointment	tube

PRINTED SUPPLIES

117.	Accumulative Rec. Cards	each
118.	Class records	each
119.	Daily memorandums	each
120.	Daily record blanks	each
121.	Enrollment cards	each
122.	Entrance cards	each
123.	File cards	pkg.
124.	Fire inspection blanks	each
125.	Manual training cards	each
126.	Physician's Cert. Child	each
127.	Physician's Cert. Teacher	each
128.	Questionaires, kdg.	each
129.	Registers	each
130.	Report blanks, ann. record	each
131.	Report blanks, cont. disease	each
132.	Report blanks, monthly	each
133.	Report blanks, sales	each
134.	Report cards, grades 1—7	each
135.	Report cards, grade 8	each
136.	Report cards, kdg	each
137.	Requisition blanks	each
138.	Schedules	each
139.	Stationery	pads
140.	Substitute report blanks	each
141.	Transfer blanks	each
142.	Transfer cards	each
143.	Writing covers	each

CUSTODIAN SUPPLIES

144.	Ammonia	pt
145.	Board cloths, outing	each
146.	Brooms	each
147.	Brushes, 16 in.	each
148.	Brushes, 18 in.	each
149.	Brushes, counter	each
150.	Brush, handles	each
151.	Brushes, radiator	each
152.	Brushes, scrubbing	each
153.	Brushes, toilet	each
154.	Chamois	each
155.	Cleaner, Dutch Cleanser	cans
156.	" Crystal	lb.
157.	" Sani flush	cans
158.	" T. C.	gal
159.	Disinfectant	gal.
160.	Dust cloths, cotton	each
161.	Dust pans	each
162.	Fuses, 15 amp	box
163.	Glue	½ pts.
164.	Light Bulbs 60 W	each
165.	" " 75 W	each
166.	" " 100 W	each
167.	" " 150 W	each
168.	" " 200 W	each
169.	Mats, door, cocoa	each
170.	Mats, tire	each
171.	Mops, wet	each
172.	Mops, handles	each
173.	Mops, dust, small	each
174.	" dust, large	each
175.	" heads, small	each
176.	" large	each
177.	" Rubon	each
178.	" dry, handles	each
179.	Mousetraps	each
180.	Poison Wheat	pkg
181.	Polish, furniture	bottle
182.	" metal	can
183.	" for mops	gal.
184.	Salt	sack
185.	Sandpaper—(No. ....)	sheet
186.	Sash Chain	bag
187.	Soap, liquid	gal.
188.	" soft	lb.
189.	" dispensors	each
190.	Sponges	each
191.	Squeegees	each
192.	Squeegee rubbers	each
193.	Sweeping compound	lb.
194.	Toilet paper	case
195.	Toilet paper holders	each
196.	Towels	case
197.	Towel holders	each
198.	Window cleaner	bottle
199.	Window cord, green	hank
200.	Window cord, tan	hank

IT WILL BE UNDERSTOOD THAT NO SUPPLIES ARE NEEDED UNLESS REQUISITION IS FILED AT THE ADMINISTRATION OFFICES BY THE 25th OF EACH MONTH.

Other needs, etc:

By .... Principal.

Supplies are requisitioned once a month or oftener as necessary. All departments make use of this requisition form to facilitate handling of the requests

direction of the building superintendent.

Those who are better carpenters than painters are assigned to replacing old floors, a program now nearing a finish. These are floors that have been in service a great many years and have deteriorated as much from the old-fashioned method of scrubbing as from constant use. Second-grade maple floor of 13/16-inch is standard replacement, sealed and treated by dry mopping after sanding and buffing with special floor machines of a well-known make.

Cabinets and changing of classroom walls, exterior cornice painting, and in some cases auditorium decoration, are among the jobs let on contract. Small repairs are done by special workmen hired by the hour. Plumbing and heating repairs are handled by the school plumber, and include installation of new boilers, plumbing fixtures, etc. Roof repairs of any size are usually handled by arrangement with special contractors.

Playground surfacing is in some instances sand and gravel, but in most cases bricked-in play areas around the buildings are a part of the minor improvements at a few schools each year.

About one-half as much as the annual cost of operation is the bill for maintenance, or 6 per cent of the entire budget of the Ottumwa schools. This amounts to 2 per cent of the property value of the school buildings and grounds.

Supplies

Bulk items such as roll towels furnished in elementary and junior high schools, and folded towels in the senior high schools, sweeping compound, and some other large bulk items, are delivered and stored at the buildings in late August for the coming season's use. Other regular needs, such as mops, cleaning materials, and some fifty stock items, are requisitioned along with other building needs from the central warehouse and stock-room once a month as needed. In case of emergency or some oversight in running almost out of supplies, deliveries are made at once.

The building superintendent delivers supplies and materials requisitioned for once a month, or oftener if necessary. The principal or teacher signs for all deliveries, checking them as on a grocery list at point of delivery to avoid errors later.

Officials Alert to Progress Elsewhere

Ottumwa school officials try to keep alert to the results attained by other school districts in better plant operation and maintenance, so that more efficient methods will make for a better educational program. Conservative planning of the different services necessary to keep the schools on a high plane is a never-ending job.

Architect studies school population trends in Ottumwa

SIMPLE TESTING PROGRAM FOR SCHOOL SUPPLIES

By H. SPILMAN BURNS

Supervisor Educational Supplies and Equipment, Baltimore City Schools

THE function of a school supply division in an educational system is to provide materials that are fitted exactly to the needs of instruction as determined by the courses of study. It is necessary to develop a program of testing that will efficiently control this function in a simple and conclusive manner within a minimum amount of time. Because of the enormous number of different items required for educational instruction, the tremendous expense and time required for setting up and operating an adequate testing laboratory based on purely scientific analyses and tests would be prohibitive. Simple tests for the greatest possible number of these materials should therefore be developed in order to determine within a few minutes, or possibly a few hours, whether the materials will meet the exact requirements when used in the classroom.

In order to carry on a simple testing program of school supplies intelligently and efficiently, it will be necessary to study closely classroom and individual pupil requirements. This means that the courses of study and classroom activities must be understood by the parties responsible for this program. Minimum standards may be established by watching the actual use of materials in the classroom, observing classroom and school exhibits, consulting with teachers, principals, and supervisors about every phase of classroom or school activity in the use of materials of instruction. In addition to having a thorough knowledge of classroom requirements, the responsible parties should be thoroughly familiar with manufacturing procedures and practices relative to these materials. The knowledge thus gained offers a foundation for a simple testing program.

When one makes an initial examination of the materials which are being used in a classroom where no minimum requirements have been previously set up, he may be surprised at the lack of uniformity in quality. In the case of some items it may be necessary to raise the quality to meet a minimum requirement, while in other cases the quality may be lowered without seriously affecting the work required. Fitting the materials to the exact classroom need is following somewhat the same procedure that the educational authority follows when he writes a course of study on some phase of the educational program to meet the requirements of a certain group of students.

It is agreed that not all testing can be done by the simple testing method. There are definite cases where certain percentages of various ingredients will be required in order that the product may be effective and that all manufacturers may have an equal opportunity in submitting competitive bids.

Definite chemical requirements may be set for such items as crayons, water colors, paper, etc., but the resultant product may not meet the classroom requirements. The manner in which the ingredients have been put together by the manufacturer will determine to a great extent their usefulness. Therefore, in writing specifications for such materials, the process of testing may be speeded up by writing the minimum classroom requirements into the specification and testing for these requirements.

It would be possible to show how practically every classroom supply item could be purchased by using an open type specification and be checked by simple tests. Several typical examples will be discussed here.

Testing Modeling Clay

For example, modeling clay may be required for school use. In order to write an open specification that can be checked by simple tests, the following procedure may be used. Determine by what age or grade level students the clay will be used and for what purposes. Upon investigation, you may find that students of all grades will use it, but the requirements and use at different grade levels will vary. Then decide whether it will be better to purchase several different qualities of clay to meet these individual needs, or better to recommend one grade of clay that will have all the required characteristics that may be necessary at different grade levels. The latter method is preferable, because improper school distribution and usage will be prevented and a better price will be obtained when purchased because of having consolidated all clay requirements. It may be learned that a soft clay will be required by small children because of lack of strength in their fingers, but when used by older students, a clay, in addition to being soft, must hold its shape and be rigid. After testing various clays, it is learned that the quality of the oils used in their manufacture controls, to a great extent, both of these requirements. A few simple tests will indicate within a period of minutes whether the clay will suffice. For example: Roll a small piece of clay into a cylindrical form from $\frac{1}{8}$-inch to $\frac{3}{16}$-inch in diameter and 4 or 5 inches long, hold this by the tip in a

horizontal position, and see if it droops or bends. If it holds its rigid position, bend it to several angles to be sure that it will hold its set position. After this, hold a lighted match or lighted bunsen burner to the end of the strip of clay until it ignites or melts. If it burns and gives off a dark smoke that has the odor of crude oil burning and the residue is a dry ash, one can be fairly sure that a low grade of oil has been used and that the use of this clay may be limited. If the clay melts or drips in soft drops either before or as it actually burns, one can be fairly sure a good grade of oil has been used in its manufacture. Examine your fingers for stains or stickiness that may be deposited in handling. If time permits, this clay may be placed in the sunlight on a piece of paper. If the oils are melted or dried out by the light and heat of the sun, the clay will not have as good lasting qualities as those which retain their oils and remain in a soft state. The specification for clay that can be tested in this manner is as follows:

Clay, Modeling: In 1-lb. pkg. Shall be soft and pliable, yet rigid, and shall maintain its shape when molded. Shall have no disagreeable odors and shall be of such a consistency that it will not be sticky or leave excess deposit or stain on fingers when handled. Shall be packed in pasteboard boxes or wrapped in heavy substantial moisture-proof paper. Sample submitted shall show type of packing. Contractor shall guarantee working and texture qualities of clay for a period of one year from delivery date to be equal to original sample submitted, and in event the quality standard does not remain consistent, he shall make replacements with new fresh clay same as original sample submitted. This clay shall be free of toxic ingredients. (Colors as desired.)

Testing Paper

Another item which can be very satisfactorily checked by simple tests is paper. When testing paper by these methods, it will be necessary to use the following minimum equipment which is especially designed for making certain mechanical tests on paper stocks: basis weight scales, Mullen Tester, calipers, and possibly an Elmendorf Tear Tester or Folding Tester. This equipment, though designed for laboratory usage, can be adapted very simply to the testing program in the average school business department, and it may be operated efficiently by anyone after receiving brief instructions.

Drawing paper has been selected for a discussion of the methods of testing. It is used in various classes from the kindergarten through senior high school. Tests and study may reveal that it will be more economical to buy several grades of drawing paper, each of which will be designed for certain uses instead of buying one that can be used as an all-purpose paper. This practice will be more economical because of the wide variations in uses between minimum and maximum classroom requirements for drawing paper.

There are at least three qualities or grades of drawing paper that may be furnished for school uses: first, those which will be suitable for crayon and pencil drawing, but permanency will not be required; second, those with some permanency, which will be satisfactory for water color and ink drawing in addition to crayon and pencil sketching, and which will stand a minimum amount of erasing with a soft eraser; and, third, paper which will be suitable for crayon, pencil, water color, mechanical drawing, and drawing ink sketching, which will stand severe erasing, and which will have qualities of permanency. If these three papers are properly used in the classroom by fitting them to the job that they are to do, it will be found that considerable economy can be practiced and each can be selected by simple test methods. The following is typical of a specification that can be used for the first type of paper, where permanency is not required:

Paper, drawing, ground wood pulp: Basis weight 24 x 36—100/M, Mullen test shall average not less than 16 points, semi-rough finish, 500 sheets to package. (Obtainable in many standard sizes and colors as desired.)

By using a specification similar to that above, it will not be necessary to refer to any brand names, since all paper manufacturers and dealers will understand the specification. The basis weight can be determined by actually weighing the paper on a basis weight scale. The Mullen test can be checked with a Mullen Tester, and since the paper is supposed to be made from ground wood stock, there is no need to check this, for ground wood is the cheapest paper stock obtainable. The finish can be determined by inspection. A typical specification for the second classification of drawing paper is:

Paper, drawing: Basis 24 x 36—140/M, Mullen test to average not less than 40 points. Finish shall have slight grain and shall be satisfactory for ink and water-color work and shall stand erasing with soft type erasers; 500 sheets to pkg. (Larger sheets should be packed with fewer sheets to pkg., obtainable in many standard sizes and colors as desired.)

(It will be noted that the basis weight and Mullen test have been increased in the above specifications.) In checking, the weight can be tested on a basis weight scale. The Mullen test can be checked with a Mullen Tester, and the finish can be checked by inspection, as previously indicated. In addition, a test by actually using water colors, crayons, etc., on the sample should be made. The stock to be used in this paper has not been mentioned, since it has been found that certain papers which contain some ground wood stock in addition to chemical wood pulp have proved satisfactory for this grade of paper. Therefore, in this particular case the Mullen test of 40

points has been relied upon to regulate the percentage of chemical wood stock that will be required to make paper of this quality satisfactory. The specification for a third type of paper is as follows:

Paper, drawing, 100% chemical wood pulp: Basis weight 24 x 36—200/M. Mullen test shall average not less than 60 points. Finish shall have slight grain and shall be suitable for ink drawing and water-color work. Surface shall stand severe erasing. (Number of sheets to pkg. will depend on size of sheet, available in various sizes and colors.)

This paper can be tested in the same manner as previously indicated, with the exception that erasing qualities should be closely checked, and a solution should be applied to the paper to determine whether there is ground wood pulp present. The fact that no ground wood is permitted in this paper will guarantee greater permanency. A test for ground wood pulp is as follows:

Make a chemical solution which consists of the following ingredients: phloroglucin, one gram; alcohol, 50 cc; concentrated hydrochloric acid, 25 cc. When this solution is applied to the paper, the ground wood fibers, if present, will turn pink or deep red in appearance. This intensity of color is more or less regulated by the amount of ground wood pulp contained.

Testing Crayon

A third item which may be of general interest is crayon. A typical specification for pressed crayon that can be checked by the simple testing program is as follows:

Crayons, pressed, 8 in metal box: hexagonal in shape, approximate size 5/16" x 3½" long. These crayons shall be strong, evenly pressed, free from air spaces and warp, and shall have a high breaking strength. All crayons shall be sharpened with a blunt point. The texture quality of these crayons shall be uniform and shall give an even distribution of color without excess "packing" and without excess "flaking" when used. All colors shall run uniform, shall be good intense hues, and each color shall blend satisfactorily with each of the different colors. They shall be free of grit and other foreign materials which will affect the quality of work which they produce. The working qualities of each color crayon shall be uniform and shall not have excess "drag," nor shall they "slide" too freely when being used. Each crayon shall be substantially wrapped in a strong paper wrapper; color of paper to be the same color as the crayon. These wrappers shall present a neat, even appearance. They shall be packed in metal boxes whose inside dimensions shall be not less than 3⅝" long x 2⅞" wide x ⅜" deep. (Tolerance to ⅛" excess of these dimensions will be permitted.) Each box shall contain one each of the following colors: red, yellow, green, blue, purple, orange, brown, black. All crayons shall be free of toxic ingredients. Bidder shall indicate brand bid on ———.

When the sample crayons have been received from all bidders, the manufacturers' brand labels should be removed and new labels replaced bearing as identification an assigned number. This should be done by persons other than those who will make the test in order that they shall not know the code numbers assigned to different brands. The crayons should then be used under conditions similar to those in the classroom. It might be well to rule blocks approximately 3 inches square on drawing paper and fill them in with the various colors of crayon submitted for consideration, making notes relative to your opinion of the working qualities at the side of each block as you use them. After all color blocks have been made, they may be mounted, making a large chart in such a way that the reds, yellows, blues, blacks, etc., of each manufacturer are in the same row. Examine the chart and notes and decide which crayons have met the needs as indicated in the specifications. Sizes of crayons, visible warps, excess breakage, kind of wrappers, etc., should be recorded in the notes. After determining which crayons meet the specifications, the numbers can then be identified with the manufacturer and brand. The above "blindfold" test will prove very helpful in selecting crayons on a competitive bid basis.

When selecting blackboard crayons, much consideration and study is necessary, since blackboard work is relied upon as one of the main classroom teaching aids. Sometimes a brand of crayon which will work satisfactorily on blackboards in one classroom and can be read clearly by students from all angles within the room may be unsatisfactory when used in another classroom, because finishes of blackboards may vary from a smooth surface to a surface which has considerable tooth or roughness. It is important, therefore, to select crayons that will work satisfactorily on all blackboards regardless of their physical condition. Sometimes it is necessary to purchase several types of crayons in order to meet adequately the needs where there is considerable variation in these finishes. There are two varieties of crayon which will usually fill these needs and they can be checked by simple test methods. These crayons are as follows:

Crayons, dustless, pressed: Recommended where blackboards are in average or good condition.
Crayons, soft, molded: Recommended for use only in schoolrooms where blackboards are in very bad condition.

Many school authorities recommend dustless crayons to be used wherever possible, not only because of their superior writing qualities, but because it is believed there are fewer free dust particles in the classrooms where dustless crayons are used. A specification for dustless crayons may be written as follows:

Crayons, pressed, blackboard, dustless: white medium hard. Shall be made of not less than 95% pure precipitated first

quality chalk (calcium carbonate) and be free from grit or any other materials in any quantity which will be injurious to slate or composition blackboards. Shall be pressed with smooth surface, free of holes and warp. Approximate size 3¼″ long x ⅜″ diameter. These crayons shall erase satisfactorily from blackboards by minimum rubbing with felt type eraser. Shall be packed one gross in a substantial box in such a way that breakage will be reduced to a minimum. A full gross box shall be submitted with bid as sample. The box in which the sample is submitted shall be the same as bidder proposes to furnish should he receive the award. Bidder shall indicate brand bid on ————.

Simple tests by which the above dustless crayons can be checked are as follows:

When the sample box is opened, count the number of sticks to be sure that there is full count in the box. Then measure several of the sticks to make sure that they are of the proper size. After this has been done, place a stick of the dustless crayon in a test tube of adequate size and add nitric acid until the crayon is completely covered with the acid. Pure chalk or calcium carbonate will react with the nitric acid, and any clay filler or binders which have been used in its manufacture will settle to the bottom of the test tube. If the chalk is 95 per cent pure, there will be very little sediment. If, however, there is any question about the percentage of sediment, a test can be made by a chemist to determine the exact chalk content. The brands of crayons found to contain at least 95 per cent calcium carbonate should then be tested by writing on a blackboard using the "blindfold" method.

As previously stated, the physical condition of blackboards in many schools varies. Therefore, we suggest using a blackboard that has been finished with at least three different degrees of finish for the writing test; that is, a blackboard with one section that has been finished very smooth, another section that has been finished with considerable tooth, and another section finished between these two extremes. These sections should be finished in such a way that in writing from left to right, the writer must write across the three different finishes. The reactions one would have in writing on this type of blackboard would be typical of those one would have in writing on a number of different blackboards in several average school buildings. If this type of board is not available, use one that will be typical of those in the majority of schools. The teachers or supervisors making these blackboard writing tests should not know the brand names of crayons being tested and should be given a piece of crayon from each box or brand being tested at least four times. As the person makes the blackboard writing test with the crayon, he may indicate his preference or opinions as follows:

1—Very good
2—Good
3—Unsatisfactory

The numbers indicated for each crayon tested can then be added and averaged. Any brand of crayon averaging 2 or more, based upon the above system of grading, should be satisfactory for purchase. In the case of tie bids, it may be the desire of the school system making the purchase to buy the brand receiving the highest rating.

The same blackboard writing procedure may be followed for testing the soft molded crayons as indicated above. The acid test, however, will not work satisfactorily, because calcium sulphate, the main ingredient of molded crayons, does not react properly in the nitric acid. A specification which may be used for the soft crayons is as follows:

Crayons, molded, blackboard, white: Shall be free from grit or any materials in any quantity which will be injurious to slate or composition blackboards. Shall be molded smooth and shall be free of holes. Approximate size 3³⁄₁₆″ long x ⁷⁄₁₆″ diameter, tapered to ⅜″ diameter. These crayons shall erase satisfactorily from blackboards, using felt type eraser with minimum erasing. Shall be packed one gross in a substantial box in such a way that breakage will be reduced to a minimum. A full gross box shall be submitted with bid as sample. The box in which the sample is submitted shall be the same as bidder proposes to furnish, should he receive the award. Bidder shall indicate brand bid on ————.

(While erasers for cleaning blackboards other than the felt type may be satisfactory, some definite type of eraser should be indicated in the specification in order to make uniform tests.

Testing Cloth

Cloth for use in home economics classes may also be purchased on open specifications and can be checked with simple tests. Many varieties of cloth for home economics classes may be purchased satisfactorily by indicating the thread count, the width, and the number of yards to the pound. In case the materials are to contain color prints or patterns, "fast colors" should be included in the specification. It is also important that pre-shrunk materials be purchased. It is usually advisable to purchase cloth in units of 30 or 60 yards if the best prices are to be obtained. Unbleached muslin, which is used in many home economics classes, may be purchased on an open specification as follows:

Muslin, cotton, unbleached: 36″ wide, 56 x 60 thread count, weight 4.00. (Other standard thread counts and weights may be used, depending upon the need.)

Samples of muslin which have been submitted for the above specification may be checked as follows:

First, measure or check the width of the material. Count the number of threads per inch. This may be done with a thread counting glass, which may be purchased in almost any optical store for about 50 cents.

If sufficient cloth is submitted for a sample, it should be weighed in order to be sure you will receive 4 yards per pound. A physical examination of the cloth to determine the amount of foreign matter, the twist of the threads, the evenness of the weave, etc., should be made. The above procedure may be followed in the purchase of print cloths, monks cloth, broadcloth, etc.

Testing Ink

In the purchase of permanent writing inks, there is a simple test which can be made in order to determine whether the ink which is being considered for purchase has permanent qualities:

Write several lines with the brand of ink to be tested on a sheet of plain writing paper. Allow this to remain in a room where the air and normal sunlight will come in contact with the writing for approximately 24 hours. Then immerse this sheet of paper in water. If the ink is permanent, the water will have little or no effect on the writing. If it is of a non-permanent nature, the dye in the ink will be washed off.

Conclusion

A well-rounded simple testing program of school classroom supplies should include the following testing procedure for all or as many items as possible to insure economy and efficiency in their purchase.

1. Test throughout the year in order to determine what the requirements or specifications will be before sending out bid proposals.
2. Test samples submitted by various bidders before making awards or placing orders. By doing this you will determine in advance of the award whether or not an item to be furnished meets specifications.
3. Test the delivered item to be sure the article delivered is equal to the sample on which the award was made.

Testing and study of classroom materials should be a continuous activity, because classroom requirements, as well as manufacturers' practices, change from time to time. Development of simple tests, therefore, is invaluable in a school supply division. The experience and ability of the department making these tests and examinations to properly interpret the results obtained is extremely important if the greatest advantages are to be realized.

RENOVATING SCHOOL PLANTS

By E. L. BICKLEY

Supervisor, Buildings and Grounds, City Schools, Nashville, Tenn.

THE city of Nashville began a $3,000,000 school building and improvement program with Federal assistance in the form of a PWA grant, in November, 1938. Included in this program were eight new buildings, three additions, and improvements to thirty existing school plants. To coordinate properly the various phases of work in planning and prosecuting this program, the City Board of Education appointed a consulting committee to advise with the project architects and to plan for needed requirements and details. This committee was composed of W. A. Bass, Superintendent of Schools; Ray L. Hamon, Professor of School Administration, George Peabody College; and the writer. The Mayor and Board of Public Works appointed Hart, Freeland & Roberts as supervising architects on the entire building and repair program.

The total enrolment in the Nashville Public Schools is approximately 30,000 pupils. New space has been provided for 9,100 of this number. Existing building conditions were improved and modernized for an additional 11,000 pupils.

For the past several years, with an average budget of approximately $35,000 a year with which to maintain 50 buildings with an estimated valuation of $7,000,000, only the more urgent repairs could be made. Several of the better-constructed school plants in the city were below standard with respect to present-day heating, lighting, and sanitation.

The more vital improvements deemed necessary were originally estimated to cost $114,000. However, through economies effected on new buildings in the program it was possible to increase the fund for improvements to $190,000. To summarize briefly, improvements included the following major types of work: (1) nine new roofs; (2) acoustical tile ceilings in six buildings; (3) new hardwood floors in nine buildings; (4) exterior painting of 29 buildings; (5) patching of plaster in 27 buildings; (6) interior painting of 27 buildings; (7) new heating plants in five buildings; (8) sanitary facilities complete in 10 buildings, and additional fixtures in 2 buildings; (9) structural changes in 13 buildings; (10) complete new electrical wiring and fixtures in 20 buildings and additional wiring in 5 buildings; (11) new linoleum or mastic tile flooring in certain areas of 11 buildings; (12) calking and weatherstripping in 4 buildings.

The supervising architects were also project architects for the remodeling work, and with their assistance thorough plant inspections were made to determine needed repairs and improvements. To properly specify remodeling work, it is essential to include all related work necessary to produce a completely acceptable finished job. This may be illustrated best by classifying some of the major types of work included and the related work necessary to produce a finished job.

Exterior Painting

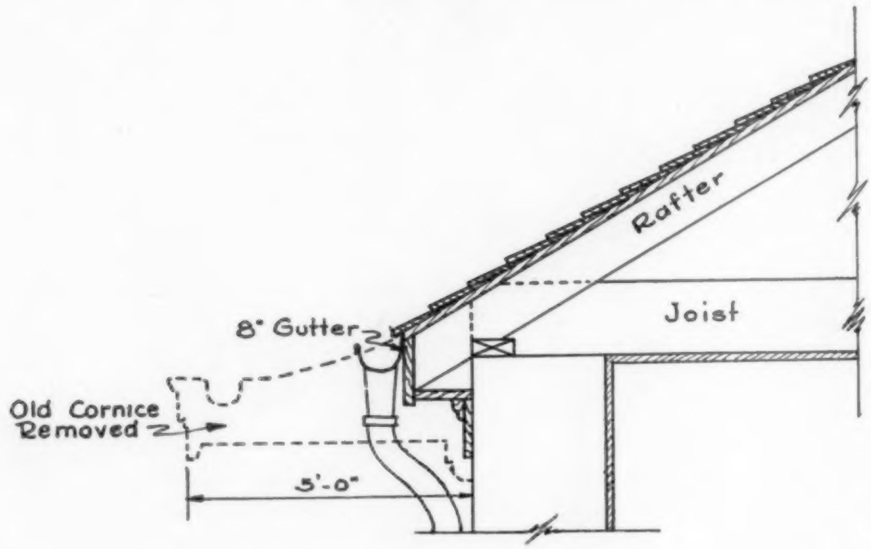
Exterior painting requires that certain related work be performed in order to secure a workmanlike job. All nail-holes and cracks in wood surfaces must be puttied first, and metal surfaces must be made free of rust and scale. Loose putty in window sash should be removed before the first coat of paint, and any glazing necessary should be done between the first and second coats of paints.

Few school systems have sufficient funds to paint as often as is necessary; and, consequently, some replacements of doors, windows, and metal are often necessary. These replacements should be made before painting is begun. Stiles and parting strips are often found rotted near the window-sill, owing to lack of protection from moisture, and they should be given a coat of linseed oil when found to be perfectly dry.

Roofing

This item of repair should be one of the first considered, since interior renovations can soon become damaged through faulty roofing. A systematic check of roofing, flashing, gutters, and downspouts, together with an interior inspection for signs of leaks, will determine the extent of needed repairs. Where the roofing material is found to have sufficient body or life and can be repaired, the damaged section should be removed and any unsound sheathing replaced before patching is done. Flashing and counter-flashing are often responsible for leaks, and where found to be faulty should be replaced in a watertight manner.

Often the only practical solution is an entire new roof; in this event, a thorough study from which specifications may be prepared is required. Flashing, gutters, and downspouts should be included in the roofing specifications. In the case of wood framing, the roof deck and its substructure are usually damaged to some extent where leaks have existed for any length of time. The old roofing should be removed entirely, and all unsound boards should be replaced.



A section showing how re-designing of a cornice eliminated the previously dangerous overhanging eaves and improved the lighting of the classrooms underneath

The contractor must assume all risks incident to replacement and any damage likely to occur. The existing type of roofing will usually determine its replacement, for the pitch and structural design will rarely permit a change in type. The roofing should be put down in strict accordance with manufacturer's specifications, and it should carry at least a ten-year written guarantee.

In one instance, where an old cornice had rusted and rotted out almost completely, it was possible by re-designing, to eliminate the previously dangerous overhanging eaves and at the same time to improve greatly the source of natural classroom light. This simple, inexpensive design is illustrated above.

Interior Painting

After roofing has been placed in proper condition and through wall leaks are corrected, the preliminaries to painting may be begun. The first step is to patch all plaster cracks and to replace any loose plaster. Every care should be taken to protect floors and equipment from damage while this work is in progress and until painting is completed. Next, all plastered surfaces should be cleaned and left free of dirt or film. This can be done with soap and water or an approved cleaner. The third step is to prime all plaster patches and to sparkle where necessary. The condition of wall paint will determine whether one or two coats of paint are required; however, where paint has still sufficient body and complete coverage after cleaning, one coat will produce satisfactory results. Where a change of color is desired, two coats of paint should be specified. The interior wood and metal trim should be cleaned and painted one coat.

From the maintenance standpoint, it is desirable to standardize on interior colors, so that when re-touch work and patching become necessary the colors may be matched easily, thus saving much time in mixing paints to match various colors, and also limiting the amount of paints necessary to stock. Colors should be selected primarily for their light-reflection qualities. A good color scheme is ivory ceilings, buff walls, and faun-brown wainscots.

Window shades are closely related to interior painting. Soiled or torn shades will become more obvious and detract greatly from the appearance of a freshly painted room. For proper protection, shades should be removed before painting is done; and they should be cleaned and repaired before they are put back at the windows, or replaced, if necessary.

Flooring

An inspection of floor conditions revealed that several serviceable buildings had floors of flat grain pine which had become badly splintered and saturated with oil, making proper cleaning methods impossible. The penetration of oil and the worn condition of floors made sanding and refinishing impractical. It was found that laying new hardwood floors on top of the old floors would prove the most economical solution, and at the same time would give the most desirable results.

In this connection, there are several details which are of great importance. The first of these is the cleaning of old floors that have been oiled. Unless the oil is thoroughly removed from old flooring, it will penetrate the new flooring and cause dark oil spots to show on the new surface. The use of trisodium phosphate or a similar material in cleaning will help greatly not only in removing the surface oil and grime, but also in drawing the oil out of the floor. This should be used freely, about one cupful to a standard-size bucket of hot water, and it should be allowed to stand on the floor for thirty minutes before surplus

water is picked up. A floor scrubbing machine can be used to advantage in this work. Where shoe mold exists, it should be carefully removed in order to re-use as much of it as possible. Next, to prevent squeaking, all loose boards should be nailed securely.

Before laying a new floor, the old floor should be covered with building paper properly lapped. The new flooring should be laid on top of the building paper and should have its lengths at right angle to the lengths of existing flooring. Where interior thresholds exist, it is best to omit them from the new floors and to replace only the exterior thresholds. Except where old thresholds have existed, doors must necessarily be removed and the bottoms dressed the thickness of new flooring. Seating arrangements should be studied carefully and improved before furniture is replaced.

Stair treads and landings were found to be in better condition than the flooring; and, by cleaning, the expense of replacement was saved. The problem of doing this without changing the height of risers at foot and head of stair runs was solved by ramping from the stairs for the 13/16-inch thickness of flooring, as in the diagram below.

The finish specified for these new floors included sanding to a fine smoothness and treating with two coats of penetrating floor seal according to manufacturer's directions.

In several buildings new toilet rooms were provided in space where wooden flooring existed. Here, 3/16-inch battleship linoleum was used by cementing it solidly to the floor, thus providing an impervious surface.

Although all basement classrooms were abandoned as such, there were certain rooms that were developed as cafeterias, playrooms, and, in some instances where space was limited, toilet rooms. The old wood flooring in these rooms was completely removed, and the concrete floor beneath was put back into use. In some of these rooms mastic tile was installed. This is an ideal solution where the use of basement space will permit the expenditure.

Acoustical Treatment

Many older buildings contain classrooms where noises are disturbing, owing to the lack of sound-absorption qualities in materials and design. This condition greatly impairs the quality of classroom work. Particularly is this true in the case of music rooms or classrooms where activity is a part of the program. In the Nashville building program, the new buildings were treated throughout by specifying ceiling treatment with an acoustical tile having a noise-reduction coefficient of not less than .50 at 512 cycles and complying with Federal Specifications Type I for acoustical tile.

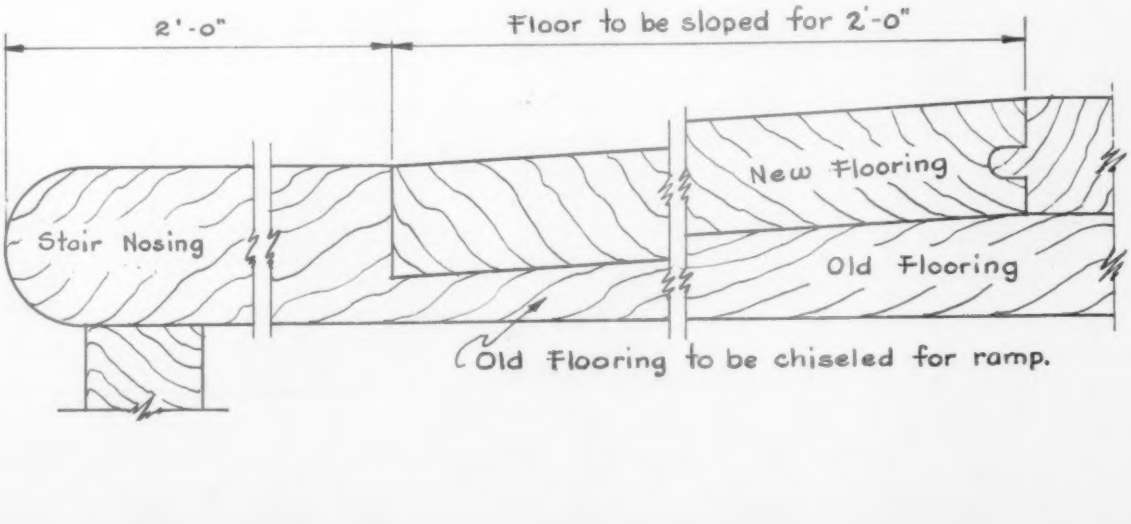
Under the repair project, four buildings were treated throughout, while two others were treated in certain special rooms. The four buildings treated throughout had dark oak stained beaded ceilings without light-reflection qualities; and although this color could have been corrected, there was a need for acoustical treatment. It so happened that new conduits for light fixtures were necessary also, and they were installed and thus concealed before the acoustical tile was nailed to the old beaded ceilings. The result, in both appearance and noise reduction, has more than justified the small additional expense of this treatment over the cost of repairing and painting the ceilings. In the two other buildings treated, noise which interfered greatly with work in several special rooms has been reduced; and a much higher degree of efficiency was noticed at once.

Heating

Aside from the variable temperatures and humidity, in a building heated with stoves there are the disadvantages in loss of space, fire hazards, and service difficulties. The janitor with ten or twelve stoves to attend to has little time during the heating season for anything else; thus cleaning and other duties are of necessity slighted.

In designing the heating layout for older buildings it is well to consider the possible sources of heat loss

Detail of ramp at stairs for new flooring where old treads can be retained



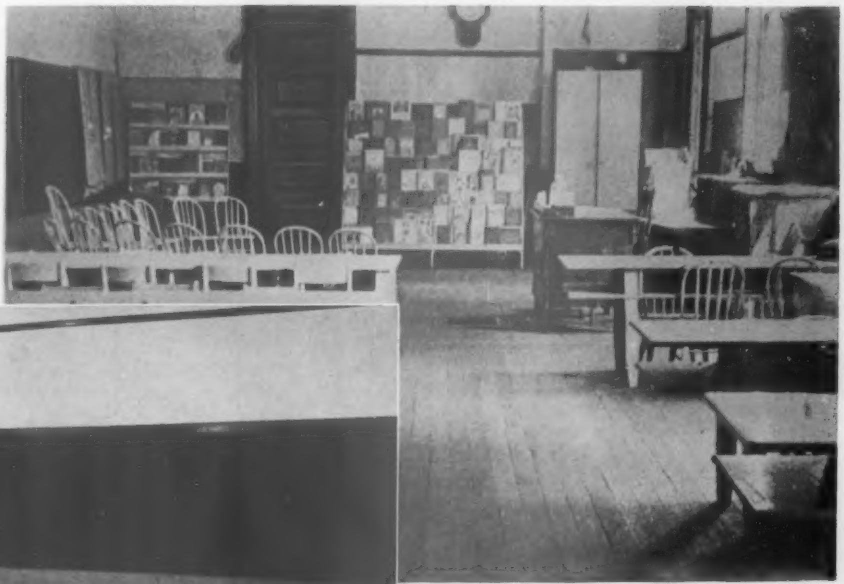
Before (left)—Many of the classrooms had antiquated lighting fixtures, and the ceilings were not acoustically treated

After (right)—Acoustical tile ceilings and semi-indirect lighting fixtures have been installed in offices, libraries and special rooms

Before (left)—Banks of lockers obstructed the flow of pupil traffic in many of the corridors

After (right)—Corridors have been modernized by the removal of the lockers and by the installation of up-to-date lighting fixtures

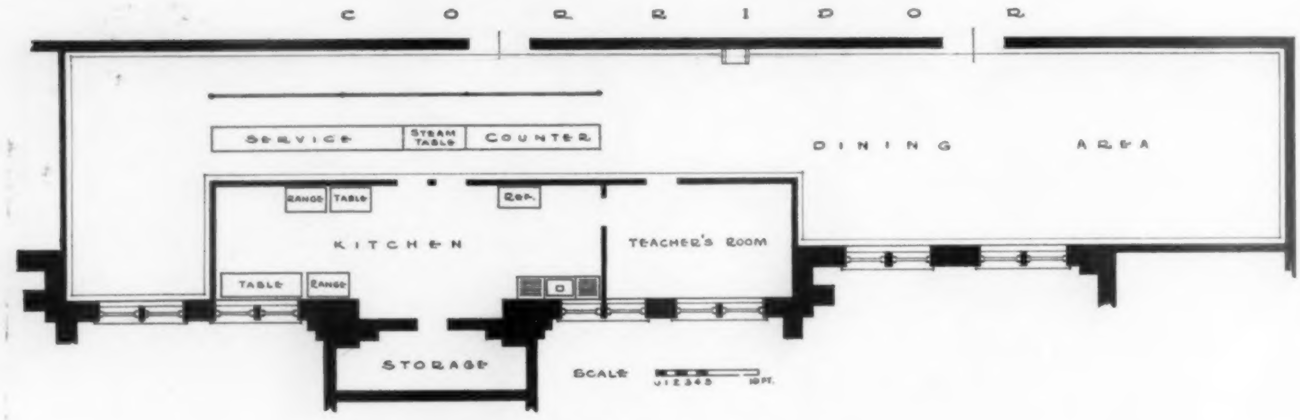
Before (right) — Old-fashioned recitation benches and double desks were to be found in many classrooms, with unsightly and unsanitary flooring underneath



After (left)—More modern seating equipment and refinished floors have greatly improved the appearance and the usefulness of the classrooms

After (right)—A new corridor, where two coat rooms used to be. New floors were laid over the old, new light fixtures and acoustical tile ceiling were installed, and the walls were repainted

After (left)—By removing a non-bearing wall and installing office glass partitions, two rooms have been converted into a modern general office



Cohn School cafeteria before remodeling

and either to correct those where possible to do so structurally or to increase the amount of radiation to compensate for this loss. In this connection, two buildings were weatherstripped and five buildings were insulated in addition to repairs and adjustments made to doors and windows. Buildings where heating plants were installed had basement space in which the boiler and fuel might be placed. In some buildings, however, it was necessary to do additional work; such as wiring, concreting floors, and covering exposed floor joists in ceilings to make fire-resistive boiler rooms.

Structural Changes

A school plant should be so designed that structural changes may be made easily to meet changes in the curriculum and to allow for future growth. Structural steel or concrete frame with curtain walls so that partitions may be removed or added is a prerequisite to good modern school design.

The accompanying plans illustrate how, by tearing out partitions and rearranging space, it was possible to increase the seating capacity in the Cohn School cafeteria from 110 to 170 pupils, and at the same time to improve greatly the efficiency of management by providing a different kitchen and service arrangement.

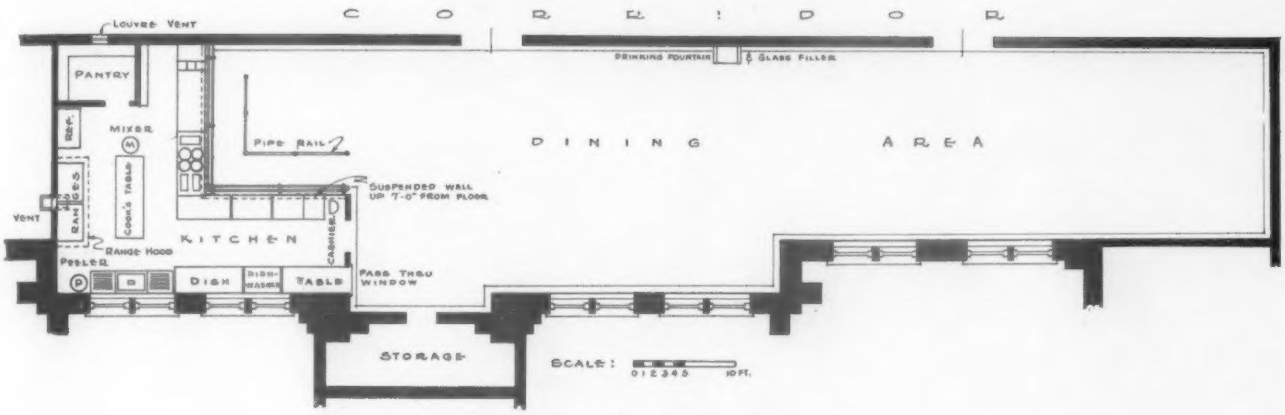
The Cohn School originally was a junior high school with an enrolment of 600 pupils; and later, when additional space was added, the senior high-school grades were offered, increasing the enrolment to 1,000 pupils. The old cafeteria was not enlarged to accommodate this increased enrolment, and it became necessary to have seven 30-minute lunch periods, running from 10:30 A.M. until 2:30 P.M. The result of this arrangement was, naturally, confusion and hunger.

The major items of expense were for additional equipment and the required mechanical connections. New equipment which was thought necessary to serve adequately approximately 750 pupils daily included dishwashing machine, potato peeler, electric mixer, service counter, range hood, electric drink box, and a cash register. This added equipment, with the existing equipment and a convenient arrangement, has improved the efficient operation and type of service.

In remodeling this space, there were two thoughts uppermost which determined every detail of planning. The seating capacity was of primary consideration; and for that reason it was necessary to move the kitchen to a confined area and to consolidate the lost space. The location of service lines for water, gas, electricity, and storage space determined the new kitchen area; and the arrangement of equipment determined the amount of space needed.

To eliminate unnecessary steps and to prevent crossing over by employees, the placement of equipment was made from a functional standpoint. The advantages achieved are seen readily by comparison of the two plans. The old kitchen arrangement required many needless steps from one piece of equipment to another, and much additional service in carrying prepared foods from the kitchen to the service counter. Also, it was necessary that soiled dishes be returned to the kitchen by service employees from a table outside. In the new plan it is possible to service the counter from the kitchen; and pupils return their trays to the dish table through the pass-window, from which point the dishes immediately enter the dishwasher. It should be noted that the location of the pass-through window has been planned so that pupils in this line do not cross or interfere with those in the service line.

To prevent odors and kitchen fumes from pervading the dining area, a range hood with exhaust vent through the roof was installed. As a further precautionary measure and also to enhance the appearance of the dining area, a wall located immediately



Cohn School cafeteria after remodeling

above the outer edge of the service counter was suspended from the ceiling to within 7 feet of the floor. This wall is shown on the plan by a dotted line. At the cashier's end of the counter there is a tile and plaster wall returning to the outside wall, thus confining and definitely separating the kitchen and dining areas. The battleship linoleum flooring in the old kitchen was removed with care and placed back into use on the new kitchen floor.

To complete this project, the room was left cheerful and attractive by painting the walls light-buff above the tan glazed brick wainscot, and the ceiling ivory. Additional light fixtures were installed to provide an adequate source of artificial light as required.

The number of lunch periods has now been reduced to four, and the cafeteria management is well pleased with the new conveniences afforded in food preparation and service.

Equipment

Considering the fact that the school building is fundamentally a plant in which instructional activities are housed, it is necessary to include equipment in the complete process of renovating school plants. The pupils' desks and classroom equipment are in a large measure responsible for their comfort.

With this in mind, the Board of Education is sponsoring an N. Y. A. project for repairing and refinishing school furniture. Under this program, during the past year 1,500 desks have been refinished completely and put back in service. Many of these desks have replaced recitation benches and double desks which have been removed entirely from service, by using equipment from buildings which have been abandoned. Thus, desks of correct sizes have been provided, with due consideration given to proper placement.

In addition to the re-seating of classrooms, many bookshelves and storage cabinets were provided to care for books and instructional materials.

The results of an improvement program such as the one undertaken in Nashville may be measured best in terms of pupil classroom achievement. Only when the equipment, lighting, heating, ventilation, and sanitation provide a comfortable, cheerful place in which to work is a pupil's best work accomplished.

THE FINISHING OF WOOD FLOORS

By L. O. ADAMS

Director, Buildings and Grounds, University of Louisville

FOR years it was the usual practice to oil wood floors in public buildings, schools, and institutions. Paraffin base oils were most commonly used, and to a lesser degree, such vegetable base oils as linseed oil. Prices of floor oils varied widely, usually in accordance with what the salesman felt the customer would pay, rather than with any quality or suitability of the oil. A little pine oil or sassafras added to give a pleasing odor increased the deception and lowered sales resistance.

A Comparison of Finishes

One of the chief talking points of floor oils was that they held the dust down. This was primarily true with the paraffin oils, which were non-drying, or at least slow-drying. Floors so treated were darkened by the accumulation of dirt on the surface and were unsanitary. Heat in the rooms frequently brought free oil to the surface, and the floors became slippery. The oil treatment increased the fire hazard. To clean such floors required scrubbing with strong detergents. Because the oil did not seal the surface, the scrubbing water penetrated the structure of the wood, with the result that the wood became warped and cupped, the grain and surface fibers were raised, and the floor was uneven and splintery and difficult to clean.

More attractive finishes were obtained with shellac, enamel, and varnish. Shellac had some desirable features, but it was distinctly a surface or film treatment, and was impractical without a wax application and constant attention to the maintenance of the wax. If the wax were allowed to wear through, and the shellac to become scratched, chipping soon followed, and the end of the finish was in sight. When refinishing of the floor became necessary, it was difficult to remove all the wax to insure that the next coat of shellac or other finish did not blister. Shellac was also subject to water-spotting. There was the further difficulty that shellac became darkened before application by the action of the shellac acids on the metal containers. Such darkened shellac would be highly unsatisfactory for use on certain wood floors, notably oak.

Enamels provided a beautiful finish to begin with, but wore through in a short time where traffic was heavy. The worn areas could not be patched satisfactorily. About the only solution was a complete refinishing of the entire floor. After several refinishings it was necessary to sand the entire area to obtain a good job. For many years varnishes were as unsatisfactory as enamels, and for the same reasons.

Early Varnish-Making

As the best methods of wood-floor finishing today center around the varnish idea, it would be interesting and helpful to trace briefly the history of varnish-making and see what improvements have been made. Old Chinese relics indicate that varnish coatings were used long before the Christian era. In the sixteenth and seventeenth centuries certain famous artisans in Europe developed their own formulas for varnishes for violins and other wood instruments. The secrets of these formulas were jealously guarded and no doubt passed away with their originators.

Varnish-making in America in the eighteenth and nineteenth centuries was patterned after the European practice. Small batches of 10 or 15 gallons were made in kettles of various shapes over coal or coke fires. There was even the traveling varnish-maker who drove up to the door of his customer, and on being told what was wanted, proceeded to cook the varnish in his wagon right in front of the door or in the yard. He was probably the forerunner of "store-door delivery" of today. In contrast to this, modern varnish-making calls for batches of 200 or even 500 to 1,000 gallons made in stainless steel kettles especially designed, using materials which are carefully analyzed and processes which are closely controlled to insure uniform quality of the product.

Introduction of Tung-Oil

No noticeable advances were made in the varnish-making industry until the dawn of the twentieth century, when a new oil was introduced from China. It was known as China wood oil, or, more properly, tung-oil. The oil is obtained from the fruit of the tung tree, which grows in profusion in the Yangtze valley. The average fruit is about the same size as a small apple. Each contains from three to seven seeds. It matures in the autumn, drops to the ground, is picked up and taken to an expressing plant, where crude machinery removes the woody hull and crushes the oil from the seeds. Besides its value as a source of tung-oil, the tung tree is highly ornamental, with its attractive clusters of pinkish-white flowers, followed by broad green leaves. Tung trees have been raised in this country for many years, but it is only in the last few years that the commercial possibilities of the tree

Left—This floor before sanding was unsightly, rough and difficult to clean. The beginning of the sanding operation is shown. The first cut is made at an angle with the boards, using No. 3½ paper. The second and third cuts are made in the direction of the boards, using No. 2½ and No. 0 or 00 paper

Right—Filling may be required if there are large cracks. The color of the floor may be darkened by using a pigment oil stain. Before application of the sealer the floor should be swept and vacuumed. Two or more coats of the sealer are required, depending upon the type of wood. The floor should be steel-wooled between coats. The final coat should be steel-wooled and waxed. The finished surface is beautiful, smooth, and easy to clean and maintain

have become recognized. Cut-over lands in northern Florida, Georgia, Alabama, Mississippi, Louisiana, and eastern Texas, where the soil is fertile and well-drained, are being taken over by this promising new industry.

It was soon found that with tung-oil faster-drying varnishes could be made, and that the varnish had much better water resistance and greater durability. An early difficulty with tung-oil was that it could not be used in large amounts with hard gums or resins, for the oil has a marked tendency to go solid if heated too high or a little too long.

Synthetic Resins

Shortly after the introduction of tung-oil it was found that by processing rosin, the natural exudation of the pine tree, with glycerin by heating, a much superior resin was developed. This was called ester gum. The varnish made from tung-oil and ester gum was fast-drying and had excellent weathering and waterproofing qualities. Thus was developed the first "spar varnish." This was the start of the making of synthetic resins, which has developed into a great industry today.

About 1905 Dr. Baekland condensed phenol and formaldehyde and produced a resin which was soon called bakelite. This early bakelite was used only for molding purposes and was not oil-soluble, and thus was not the product which fills such an important place in the varnish-making industry today. Later it was found that by combining rosin with phenol and formaldehyde an oil-soluble resin was produced. This became known as modified phenol resin and is today the back-bone of the so-called four-hour varnishes and enamels.

Through continued research it is now possible to produce oil-soluble synthetic resins which have no rosin at all; that is, they are 100 per cent phenolic. With this resin it is possible, with proper combinations of tung-oil and the right solvent, to produce a varnish which has high durability, water resistance, and alkali resistance, and retains its gloss and integrity of film many times longer than the varnishes of yesterday. As would be expected, these modern varnishes find wide application in the finishing of floors, and when combined with pigment make high-quality enamels, and with aluminum make excellent coatings for bridges, tanks, and other metal structures.

Types of Varnishes

There are three general types of varnishes—spirit varnishes, oil varnishes (bodied oils), oleo-resinous varnishes.

Spirit varnishes consist of solutions of gum in alcohol. Shellac is the best-known of this group.

Oil varnishes consist of vegetable drying or semi-drying oils which have been cooked to obtain the desired body. They are generally known as bodied oils, and are in turn used in making oleo-resinous varnishes and are added to certain paints to provide flow and gloss. They are also used in the patent-leather industry and in the manufacture of printing inks, where they are often called litho-varnishes.

Oleo-resinous varnishes are those in which we are mainly interested for the finishing of wood floors. As the name implies, they consist of oils and resins. The resin is melted at high temperature and is combined with vegetable oils and small amounts of metallic dryers, and thinned with such solvents as turpentine or mineral distillates.

Resins in Varnishes

Types of resins used in the making of varnishes include the synthetic resins, such as modified and straight phenolics, and natural resins such as Congo and kauri, which are dug from the earth, and rosin, the exudation of the pine tree. All these come under the general term "resin." Large quantities of rosin are still used in the manufacture of special types of paints and varnishes and as a flux to aid in melting the harder resins. Ester gum has a wide use, alone with oils and in combination with the synthetic resins. Natural resins continue to be used for some furniture finishes. These various resins, alone or in combination, offer an almost unlimited choice as to water resistance, resistance to abrasion, chemical resistance, color, and price.

Oils in Varnishes

There are several types of oils used in oleo-resinous varnishes. Tung-oil, as stated, is one of these. Linseed oil and Perilla oil are used to a considerable extent. These are all drying oils. There are also the semi-drying soya bean and fish oils. Fish oil is obtained from pressing the little menhaden fish, found in the Atlantic Ocean, and from the sardine of the Pacific Ocean. It is, in some respects, preferable to linseed oil, and has excellent heat-resisting features duplicated by no other oil.

The term "oil-length" used in connection with varnishes means the number of gallons of oil to the 100 pounds of resin or gum. Thus, a short-oil varnish is one containing a small amount, say 6 to 12 gallons, of oil to 100 pounds of gum. Long-oil varnishes are those which contain 30 gallons or more to 100 pounds of resin. In between are the medium-short and medium-long varnishes. In consideration of oil-length, the oil and resin or gum only are considered; the thinner does not enter into this calculation.

The unsettled conditions in China in recent years

have sharply affected the tung-oil market, making its continued use an economic gamble. As the domestic crop furnishes only about 5 per cent of the requirement, extensive research has been carried on to find a substitute for tung-oil. A great deal of information is being compiled in research laboratories regarding the use of domestic-grown Perilla, heretofore procurable only from Manchuria. Other possibilities are walnut oil and the Brazilian oil known as Oiticica, which closely resembles tung-oil, except for durability. The much-despised castor oil, properly processed, has been found to have many of the qualities of tung-oil. This oil, which is the slowest of the non-drying oils, has, by the process of de-hydration, come to be one of the fastest of the drying oils. Many new oils are being investigated for production in Texas and in other southern states. This work, which is being pushed by the Department of Agriculture, will be a great benefit, both to the farmer and to the paint and varnish industry.

The Solid Content of Varnish

In considering what makes a good floor varnish, the solid portion is of great importance. If it is a short-oil resin or ester gum varnish, it will be brittle and will chip off under the impact of traffic. If it is a long-oil varnish made with cheap resin, it will mar easily. If short in oil but having a hard resin, it will not chip so readily, but will mar somewhat. If the varnish is long in oil and contains hard resin, the tendency to mar will be practically eliminated and the toughness and elasticity will be excellent. The straight phenolic resins are the hardest resins known, and when properly combined with suitable oils in the right proportion, provide films which are unsurpassed. The solid content is therefore of utmost importance.

A little arithmetic on per cent of solids and film thickness is of interest. If we spread 1 gallon of varnish over an area of 1,000 square feet, we find that the thickness of the film is dependent upon the solid content in the following manner:

40%	solids	produce	a	film	.00056	of	an	inch	thick	(1 coat)
50%	"	"	"	"	.00072	"	"	"	"	" "
60%	"	"	"	"	.00086	"	"	"	"	" "

Thus, two coats of a 60% solid varnish would produce a thicker film than three coats of a 40% solid varnish. If the 60% costs $2.50 per gallon, and the 40% $1.50, the 60% is still cheaper because of the saving in labor of two coats as compared to three coats.

Applying High-Solid Content Varnish

There are many places where a high-solid content varnish should not be put on straight, as, for example, on a hardwood floor subject to heavy traffic. Here the same high-solid varnish should be used, but it should be reduced with turpentine or mineral spirits to obtain penetration and sealing of the pores of the wood against the ingress of dirt, but without building up a surface film. Steel-wooling between coats will insure against surface film. A floor so treated can be cleaned with steel wool without marring the surface and can be patched in the traffic lanes without the patch being unsightly.

For softwood floors, particularly flat grain, of which there are many still in older schools, some surface film is needed to bind the surface fibers of the wood against splintering. Here the high-solid content varnish should be cut possibly 25 per cent for the first and second coats, and a third coat put on straight. It is important that each coat be allowed to dry thoroughly and then steel-wooled before putting on the next coat. With a good grade of varnish such as has been described, and reasonable attention to waxing, the film treatment will give excellent results, and the slight wear in traffic lanes can be patched satisfactorily.

In preparing the surface, sanding is the most satisfactory solution. The finish cut should be made with 0 or 00 paper to insure a smooth job. If a coarse grade is used to finish, sander marks which do not show up before the finish is applied will be glaringly apparent after the first coat is on.

The removal of wax to prevent slow drying of subsequent coats when refinishing in worn areas is not a problem with this method of floor treatment. The areas are steel-wooled and the finish applied. After this has had time to set up, the surface is again steel-wooled to remove any excess which has not penetrated into the wood. Where the wax coating remains intact underneath, the fresh finish does not penetrate the wax film, and the steel-wooling removes it completely, eliminating any tendency of the surface to become tacky, cheesy, and unsightly.

Fillers

Floors which have wide cracks or open grain should be filled before application of the first coat of varnish. A good filler can be made from 80 per cent whiting, silica, and yellow ocher in a short-oil resin varnish. Such a filler can be obtained from any good paint and varnish manufacturer. The filler should be cut down with turpentine to a creamy consistency, spread on the floor with a rubber floor squeegee, rubbing in the direction of the grain. The excess should be rubbed in with burlap or excelsior, rubbing across the grain. The large cracks should be filled with the paste, uncut. After the filler is dry and the floor has been swept clean of loose particles, the surface is ready for the first varnish coat.

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for the Efficient Yet Economical Cleaning and Maintenance of School Floors

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Shine-All
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SUPER SHINE-ALL. Not a soap, but a neutral liquid chemical cleaner for all types of floors, also painted and varnished surfaces. It possesses 100% active cleaning units. Super Shine-All cleans, polishes, and preserves in one operation, requiring no rinsing. Saves time and labor. Officially endorsed by leading floor manufacturers. The one cleaning material that is qualified for safe use on every description of floor or wall surface.

HIL-TONE. Hil-Tone removes rubber burns and other marks from wood floors. It not only removes the marks easily when properly used but also seals and protects the wood itself. The wood retains its light color and does not become oily or greasy as when ordinary dressings are used.

HIL-BRITE. A self-polishing water emulsion wax that dries bright without rubbing or polishing, with a hard traffic-resisting finish, yet has that soft lustrous glow of polished wax. It saves time and labor; cuts your waxing and cleaning costs in half. Endorsed by national floor manufacturers.

ONEX-SEAL. Gives positive protection and restores the original attractive finish to terrazzo, tile and cement. Tests proved Onex-Seal capable of withstanding the most severe weather and traffic conditions. Onex-Seal produces a waterproof, weatherproof, dust-resistant, sealed polished surface. Nationally recommended by flooring contractors and manufacturers.

TERRAZZINE. Excels for thorough curing and sealing of new terrazzo, approved by the National Terrazzo and Mosaic Assn., also used and endorsed by leading terrazzo contractors and has a nation-wide reputation for highest quality. Economical and simple to apply.

HIL-GLO FINISH. Especially designed to serve on classroom and gymnasium floors. Universally used for the reclamation and preservation of wood floors in all types of buildings. Hil-Glo Finish is supreme for wearing quality, is non-skid, and does not easily rubber-burn.

SUPER GYM FINISH. Produces a non-slippery, durable and sanitary floor, easy to maintain. Withstands hard and constant wear; gives proper reflection of light, eliminating eye strain; insures a perfect non-slippery surface which will not rubber-burn. Nationally used by leading schools, universities and athletic clubs, private and public institutions.

To protect our customers against imitations all Hillyard products are registered and trademarked and shipped in sealed, checker board designed containers

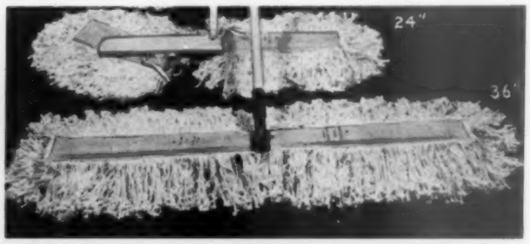
DIAMOND FINISH. Produces a brilliant, long-wearing surface, easy to apply with brush or mop. Quick-drying and especially adapted for wood floors.

PENETRATING SEAL NO. 21. The purpose of Penetrating Seal is to seal the fibre against penetration of dirt, ink stains and moisture, to preserve the natural color of the floor and provide a more permanent finish that is both beautiful and economical, and to reduce maintenance costs. Penetrating Seal No. 21 and Hil-Brite Self Polishing Wax is the ideal treatment for floors of classrooms, corridors, assembly halls, etc. This treatment preserves the natural color of the wood, is easily and economically maintained, and produces a durable and attractive finish.

HILLYARD'S WOOD PRIMER. Definitely seals and preserves; insures an ideal surface for the application of any desired finish or treatment. Universally used for the reclamation and preservation of wood floors in all types of buildings.

RENOVATOR. Hopelessly black and gummy floors can be brought out to look like new with Hillyard's Renovator. Oil-soaked wood floors can be scrubbed and bleached to a light color. The extra power in Renovator makes the toughest job easy.

DUSTLESS SWEEPING BRUSH. Leaves a clean lustrous surface, absorbs the dust, saves labor. The wicks are detachable and washable.



"FROM COAST TO COAST"

Madison Square Garden, New York, N. Y. — **Stanford University Basketball Pavilion, Palo Alto, Calif.**

HILLYARDS' MODERN FLOOR MACHINES

16-inch
For use in small buildings

19-inch
For medium work

22-inch
For heavy duty

Note low, streamline construction, permitting use under desks and furniture. You'll like the "Lowboy"

The New Steeltonian *for heavy duty*

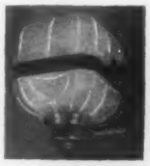
HILLYARD'S STEELTONIAN STEELWOOLING MACHINE (built in 10″ and 20″ Models). Modern floors demand modern maintenance methods. The "Steeltonian" economically reconditions and maintains floors of wood, linoleum, asphalt tile, rubber tile, etc. Uses standard type of steel wool in ribbon form, which is easily applied. No expensive patented steel wool drums to buy.

OTHER HILLYARD PRODUCTS. Besides floor finishes and waxes, floor brushes and floor machines, Hillyard's full line of 97 products includes cleaners, disinfectants, deodorants, soaps, modern janitors' equipment and sanitary appliances all types of brushes, toilet paper and paper towels and many other items for school use.

THE NEW HILTONIAN LOWBOY SCRUBBING AND WAXING MACHINE. Leads the field in utility, efficiency and economy. A favorite with all users. Speed, power and weight are co-ordinated to produce the utmost in service at a minimum of effort and expense. Correct mechanical principles result in a machine that is perfectly balanced, silent in operation, easy to handle, steady and straight running. The "Hiltonian Lowboy," being a multiple-brush machine, does a better job in less than ordinary time and more easily.

BRUSHES FOR EVERY NEED. Brushes are available, including Bassine, Tampico, Union Mix, Steel Wool Plates. There are also attachment plates to which sandpaper or burnishing pads can be easily fastened.

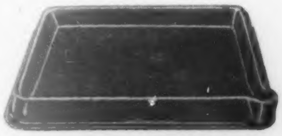
WINDO-CLEAN. This lightning cleaner dissolves grime and removes dirt. No effort. No mess. No hard work. Eliminates buckets, sponges, water, squeegees and chamois, and makes glass sparkle.



VICTOR SOAP DISPENSER. Built substantially in modernistic design with frame of brass, chromium plated. The bowl of opalescent glass, hung in the frame on an eccentric balance, automatically rights itself, preventing loss of soap by drippage. No springs to get out of order. A ball-bearing valve releases small amounts of soap. Adapted to two positions, either upright or mounted on wall.

VELVA-SAN HAND SOAP. Shipped in concentrated form, insuring the customer of 100% value in every gallon. Although usually shipped and prepared in its natural state, Velva-San may be had in various colors and perfumes. Velva-San provides individual hygiene when used in our dispensers. It is a forward step toward eliminating sickness and disease spread by unsanitary bar soap.

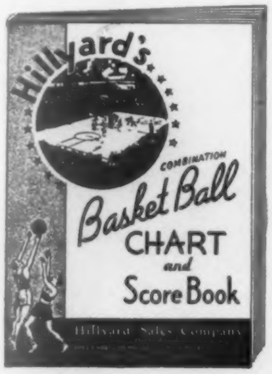
HI-KO DISINFECTANT. A concentrated stabilized sodium hypochlorite solution. When diluted with water in large proportions, it is effective as a sterilizer, antiseptic, germicide and deodorant. Used in correct solution in a rubber foot bath tray it helps to rid showers and locker rooms of the troublesome germ which causes "Athlete's Foot."



Rubber Foot Bath Tray

PINE-O-CIDE, ANOTHER EFFICIENT DISINFECTANT. An efficient liquid, amber-colored, both antiseptic and disinfecting. Compounded from steam double distilled Pine Oil, it possesses a pleasant pine odor which is soothing to the membranes of the nose and throat. Pine-O-Cide is soluble in water, forming a beautiful milk white emulsion, possessing a typhoid phenol co-efficient of five, "F.D.A." Method (report of testing laboratory furnished on request). The use of Pine-O-Cide promotes sanitation in schools and public buildings.

FREE ON REQUEST . . . FOUR VALUABLE HELPS



THE AMERICAN CRAYON COMPANY

Manufacturers of a Quality Line of Floor Sealers and Finishes

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•KAYSAN—THE PERFECT SEALER AND FINISH FOR EVERY HARD-SERVICE CONDITION

•KAYSAN is manufactured by the makers of the first penetrating varnish developed for heavy-duty, hard-service wood floors. It is recommended without reservation for schools, stores, factories, offices, clubs, public buildings, apartment houses and similar types of buildings where wood floors receive excessive wear but must be attractive and in keeping with their surroundings. KAYSAN can be used effectively not only on wood but also on terrazzo and on linoleum (battleship and inlaid).

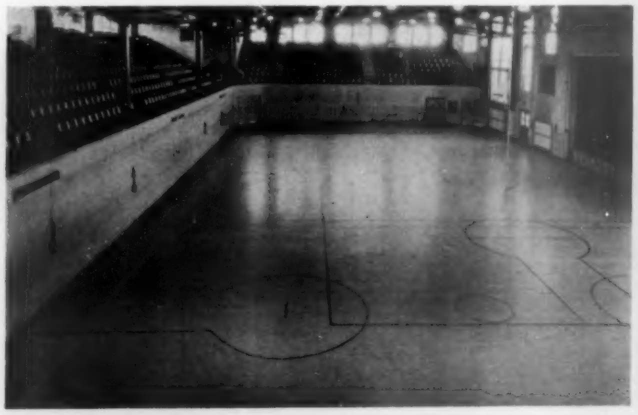
KAYSAN Has All These Remarkable Qualities

Brings out the full beauty of the grain
Needs never be refinished
Will not show laps
Dries bone dry
Withstands the hardest usage
Easily cleaned
Reduces time and labor
A very durable finish
Applies easily, seals the wood, prevents slipping, gives a lustrous finish and takes hard wear.

KAYSAN allows the wood to more nearly retain its natural wood appearance than any other finish.

Cost of Application

Its ease of application and minimum cost of maintenance makes finishing with KAYSAN very economical.



One of the many High School Gym Floors finished and maintained year after year with Kaysan

Covering Capacity

Under average conditions, 1 gallon of KAYSAN finishes on oak, approximately 300 square feet with three applications; on maple, 400 square feet with two applications.

FILTITE—An excellent seal and finish recommended for concrete floors and similar surfaces. It fills the pores, binds the small particles of concrete together, preserves, toughens and prevents dusting, improves the appearance, and at the same time seals the concrete against the penetration of grease, oils and many other stains.

FILTITE is easily, quickly and economically applied and maintained. Write for full directions, prices, etc.

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Whiz

WAXES & POLISHES

WHIZ SELF-POLISHING FLOOR WAX

A heavy duty wax, specially developed to stand up under heavy traffic. Provides a hard, tough, wear-resistant and non-slip surface. Will not water spot or re-emulsify. Withstands 14 moppings with mild solution of soap and water. Requires no rubbing. Dries quickly to hard, bright gloss. Lasts longer. Does not contain ammonia. Non-inflammable. One gallon covers approximately 2500 sq. ft. For use on linoleum, wood, rubber composition, cork, asphalt and cement floors.

DRAKE NO-RUBBING FLOOR WAX

Very efficient and economical floor wax, for use on floors where traffic is not extremely heavy. Provides a lustrous, water-resistant and non-slippery surface. Will not wash off. Will not pock or bleed finest floors. Does not contain ammonia. For use on wood, linoleum, rubber, asphalt, cork and cement floors.

WHIZ LIQUID FLOOR WAX, Oil Base

Produces very tough waterproof and wear-resistant surface. Dries in 10 to 20 minutes and buffs to a high polish. Suitable for wood, linoleum and cork floors, wood and metal furniture. Not for use on asphalt or composition floors.

WHIZ PINE OIL AND MINERAL OIL DISINFECTANT No. 600

Economical. Commercial type. Forms white emulsion in water. Useable as spray or in scrub water. Diluted 40 to 1 with water has germ killing strength equal to 5% solution of phenol. Co-efficient 2.

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WHIZ INSECT KILLER, Odorless

A powerful, pyrethrum base liquid insecticide. Kills flies, mosquitoes, roaches, other flying, crawling insects by causing suffocation. Harmless to human beings, pets. Will not stain when used according to directions. May be used around food without causing taint or absorption.

DRAKE INSECT KILLER

Competitively priced, high quality, pyrethrum extract insect spray with proven high kill percentage. Stainless when used according to directions. Pleasantly scented.

WHIZ BED BUG DESTROYER

Most effective product of its type. More sold than all other brands combined. One application is usually sufficient. Kills bed bugs and their eggs as well.

WHIZ UNIFOAM SOAP

A pure, hard vegetable oil soap. So neutral it can be used for shaving. Readily soluble in water. Produces thick, soapy washing solution that cleanses thoroughly, quickly. Will not film or streak. Most efficient and economical on market.

WHIZ LIQUID HAND SOAP

A pure soap, producing a rich, creamy lather that immediately dissolves dirt, grime. Glycerine content leaves hands soft, smooth; prevents dryness, chafing, chapping.

WHIZ GERM-O-ZONE

A coal tar product well known for its bacteriological efficiency. Acts as disinfectant, germicide, cleanser and deodorant. Has a phenol co-efficient of 8 (FDA) — 8 times more powerful than carbolic acid, yet safe to use.

WHIZ No. 500 PINE OIL DISINFECTANT

Pure, steam distilled. Added to water it makes a fine deodorant for washing floors, toilets, urinals, etc. Used as a spray, it revitalizes, purifies air in wash rooms, locker rooms, sick rooms. Conforms to U. S. Government standards. Co-efficient 4.

WHIZ PASTE FLOOR WAX

For floors and furniture subject to hard wear. Dries quickly to a dry, tough film that is easily buffed to high luster. Not affected by heat or moisture. Guaranteed not to pock or bleed finest floors.

NEW!

EASY!

UNIFOAM SOAP SYSTEM

A miniature soap factory. Saves time and money. You just add water. Proper solution forms automatically. Draw off as much soap solution as desired, dilute with cold or hot water and washing water is ready for use.

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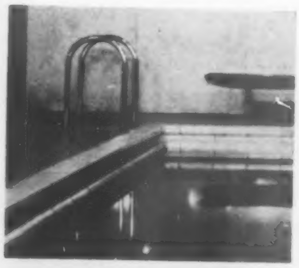
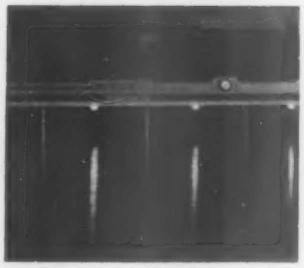
AND PRINCIPAL CITIES IN CANADA



SHOWERSAN

A new odorless disinfectant, which if used as directed, will help prevent the spread of "Athlete's Foot." Also used to disinfect washrooms and locker room floors, dressing rooms, runways and diving boards. Showersan will help maintain your swimming pool in a sanitary condition. A West Rubber Foot Tray, filled with a solution of Showersan should be placed in the entrance to the shower room.



LASTINCOTE

An easily applied beautiful, glossy yet non-skid finish, especially prepared to stand up under gymnasium wear and tear, or other heavy traffic. Hard enough to help retard the action of rubber burns and scratches resulting from hard usage. Lastincote makes floors much more resistant to alcohol, body perspiration, alkali soaps, acids, boiling water, ink, oil, grease, salt or fresh water. Approved by Maple Flooring Mfrs. Assn.

DEODORANTS

An efficient method of deodorization in lavatories is the West Automatic Drip Machine. The special drip fluid spreads on the surface of the water, and helps overcome bad odors at the source. However, no matter how efficient automatic deodorization may be, the daily or routine use of a cleansing disinfectant such as Coro-Noleum on washroom floors, basins, seats, etc., is important.

KOTEX VENDING MACHINES

Available in 2 sizes—D type, holding thirty Kotex pads, and the smaller No. 6 cabinet for use where available wall space is limited. Both coin operated. Each Kotex pad individually wrapped in sealed envelope with two safety pins. Packed in cartons of 300.

LIQUID SOAPS

West Liquid Soaps are uniform and of superior quality. Made of pure vegetable and coconut oils, the finished product is treated, aged and retested several times before leaving the factory. West Liquid Soaps tend not to irritate or dry the skin. Liquid Soap besides being sanitary and safe, eliminates waste of partially used cake soap which might be thrown or taken away.

LATHERATOR

Instead of merely dispensing liquid soap to be worked into a lather by the user, the Latherator Liquid Soap Valve automatically agitates the soap into a rich creamy lather before it leaves the outlet. Pre-lathered soap washes 40% to 50% more hands than unlathered soap—a material saving. Whether you require individual basin dispensers or a gravity tank Soaparatus system, compare costs with your present equipment.

PAPER TOWELS

The West Disinfecting Company manufactures a complete line of paper towels from fresh, clean pulp in its own mills. Standardized quality is obtained by expert scientific manufacturing control. West Towels are made in either Junior or Senior sizes and in 32 lb. or 38 lb. basic weights. In addition, the Tandem (double towel) is obtainable and is popular with institutions where costs are carefully checked.

FREE—"Scope of Sanitation"

Write West Disinfecting Company, Dept. BU, 42-16 West Street, Long Island City, N. Y., for your free copy of this valuable booklet. Profusely illustrated. Contains detailed information on these and many other products for the promotion of sanitation.

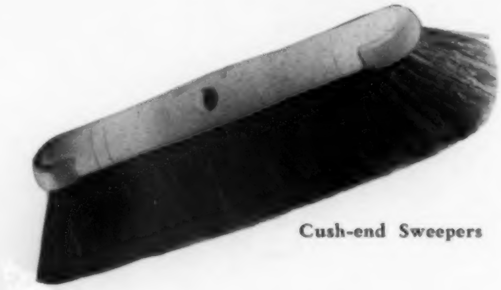
. . . PRODUCTS FOR THE WEST A WEST GUARANTEED PRODUCT PROMOTION OF SANITATION

J. I. HOLCOMB MFG. COMPANY

— Manufacturers of *SPEED* Cleaning Tools —

New York | Indianapolis, Indiana | San Francisco

"Cleaning Headquarters"

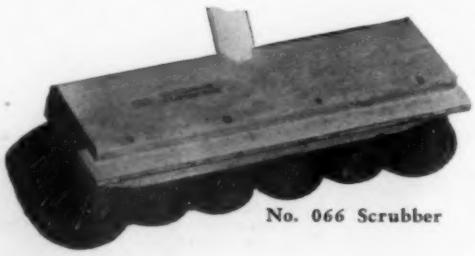


Cush-end Sweepers

No. 414 Dustless Sweepers

414 DUSTLESS SWEEPER

Thousands of dust and dirt absorbent strands pick up and hold soil until shaken. For FASTER sweeping of all polished surface floors. It's noiseless, FAST, WASHABLE and has interchangeable heads. Block widths up to 42".



No. 066 Scrubber

"CUSH-END" SWEEPER

Built-in rubber cushions on each end of the block encourage FASTER sweeping. There's no danger of damage to block ends or furniture and it's NOISELESS. Offered in a complete line of sweepers for every floor surface.

No. 6 Toilet Brush

NO. 066 SCRUBBER

The 066 Scrubber with rubber water scraper is TWO TOOLS in ONE. It has 33,000 dirt fighting diggers. It's another Holcomb SPEED cleaning tool. The rubber "squeegee" keeps scrubbing solution ahead of the brush—the floor dries quickly.

NO. 6 TOILET BRUSH

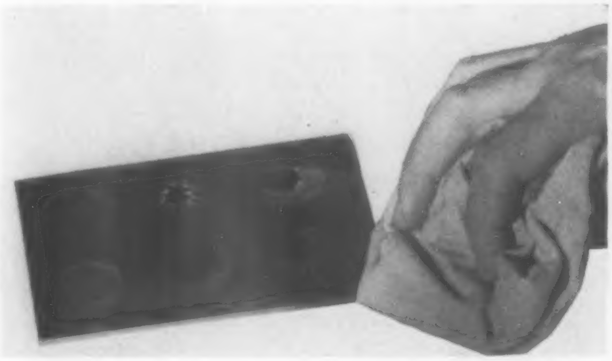
This nationally famous toilet brush is built ON not in the handle. Stiff Bassine wings get that under-the-rim scum and odor. Head of aggressive Palmetto Fiber fits the bowl sides and drain hole. Sturdy, straight handle permits around the bowl cleaning without changing grip.

No-mar Mop

NO-MAR MOPS

The new Holcomb Wet Mop. Quick change heads will not mar furniture, baseboards nor scratch any surface. Picks up 4 times its own weight of soap solution—wrings out completely to the head. Cuts mopping time 20%. In 16-20-24-32 oz. heads.

J. I. HOLCOMB MFG. CO. — INDIANAPOLIS, INDIANA



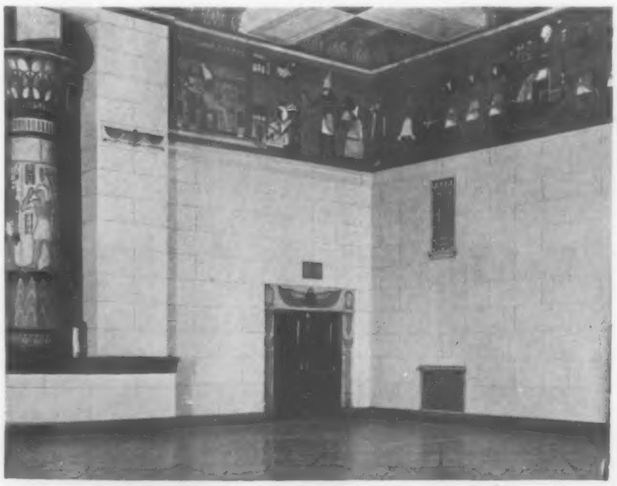
Make This Test *Yourself*. Send for Sample!

Tested on the floor of the "Ford" Rotunda, Holcomb Water Proof Wax **lasted four times longer** than waxes they formerly used. **This cut application time cost 75%!**

•

NU-FINISH
It Cleans As It Polishes!

A Furniture Polisher and Retreater. NU-FINISH polishes, restores original luster, keeps wood free from dust. It removes that blue, dull, smoky appearance. It protects the surface, leaving no grease nor film. Nu-Finish is a splendid retreater for yarn mops and dusters such as the No. 414 on page opposite.



Holcomb WATER PROOF WAX
The Most Water Proof Wax Money Can Buy!

Holcomb WATER PROOF WAX *IS* waterproof. Test it against any waterproof wax you are now using. Put spots of Holcomb Water Proof Wax and other waxes on a piece of glass and allow them to dry. Drop water spot on them all. Let stand and then wipe off. Note how water will NOT loosen Holcomb Wax . . . proving it can be wet mopped without removing wax. It wears longer—it patches perfectly in traffic lanes.

VITALIZED CLEANING COMPOUND

FLOATS off grease and dirt—without scrubbing. It is a popular Holcomb SPEED cleaner. It is HARMLESS to any surface which water alone will not harm. Use it on walls, floors, woodwork, etc. Vitalized Cleaning Compound cleans ALL SIX kinds of dirt: earth, grease, tar, mineral, metallic and sugar.

J. I. HOLCOMB MFG. CO. **INDIANAPOLIS, INDIANA**

MIDLAND
CHEMICAL LABORATORIES, Inc.

Manufacturers of

Floor Seals—Finishes—Waxes and Cleansers, Liquid and Jelly Soaps—Disinfectants—Insecticides—and General Cleansing Products

Dubuque, Iowa, U. S. A.

THE COMPANY

Purchase Midland Quality Products with assurance of satisfaction and service. Midland Products are backed, not only by more than a third of a century of manufacturing experience, but also by skillful formulation of fine quality raw materials, selected to produce results you have a right to expect.

Economy . . . the art of getting the worth of your money . . . is an essential in Midland Quality Products. With Midland Quality, it is not a question of what you pay for what you get, but rather, what you get for what you pay.

BASIC LIQUID SOAP

42-44% Anhydrous

A heavy bodied, highly concentrated liquid soap which can be diluted several times its own weight with water and still produce a fine, cleansing lather. This soap is produced from imported olive, cocoanut, and castor oils. It contains no added fillers. Basic Liquid Soap is available in the following odors—Lilac, Boquet and Bay.

Basic Liquid Soap is manufactured by Midland Chemical Laboratories, Inc., Dubuque, Iowa.

LACQAIRLUSTR

"Cleans as It Polishes"

Midland Lacqairlustr cleans as it polishes varnished and enameled surfaces, in one easy operation. It leaves the surface with an attractive gloss, without buffing or polishing. We solicit your inquiries on the use of Lacqairlustr in the Monitor system.

Lacqairlustr is manufactured by Midland Chemical Laboratories, Inc., Dubuque, Iowa.

Other SUNSHINE PRODUCTS

SHILOH—Porcelain and Enamel Cleanser.
PIPEOLEUM—Drain Pipe Cleanser.
FLUSHOLEUM—Bowl Cleanser and
LOHZONE—Deodorant Blocks and Crystals.

ATHALOH

Aids the Control of "Athlete's Foot"

This chlorine disinfectant can be used for general disinfecting. However, it is more widely used in preventing the spread of the infection known as "athlete's foot." In this regard, it can be used either in stepping pans or as a spray. Athaloh has an available chlorine content of 8%.

Athaloh is manufactured by Midland Chemical Laboratories, Inc., Dubuque, Iowa.

GLEEMZ

Modern Super Cleanser

This neutral cleanser contains no acids and no alkalies. It cleans quickly, does not produce lap-marks. It is excellent for use on painted, enameled or varnished surfaces; for cleaning floors and in the laundry. It does not harm delicate colors which are not normally affected by water.

Gleemz is manufactured by Midland Chemical Laboratories, Inc., Dubuque, Iowa.

FLOOR MASTER

Silent Scrubbing and Polishing Machines

SIZES
Single Brush
12" and 15"
Twin Brush
16" and 21"

PLEASE REFER TO NEXT PAGE FOR INFORMATION ON MIDLAND FLOOR PRODUCTS MANUFACTURED BY MIDLAND CHEMICAL LABORATORIES, INC., DUBUQUE, IOWA

THE SELIG COMPANY, INC.

DALLAS ATLANTA NEW ORLEANS

Manufacturers of

Disinfectants — Insecticides — Sanitary Supplies

ESTABLISHED 1896

Library, Agnes Scott College, Decatur, Ga.
Asphalt Tile Floor finished with O-Brite-O

O-BRITE-O

Those desiring a really fine self-polishing wax will find O-Brite-O to be above the usual. O-Brite-O really dries with a shine. Because of its unusually high content of the finest number one pure Carnauba wax unadulterated by cheaper, inferior soft waxes; O-Brite-O, when dry, leaves a hard resilient long wearing surface. It is easily maintained and not only wears well but looks well. A trial will certainly convince you. O-BRITE-O IS SAFE TO USE ON ANY TYPE OF FLOOR.

VARNAWAX

A high grade wax of strictly number one pure refined Carnauba wax combined with certain varnish gums in an oil solvent vehicle. Varnawax produces a hard resilient, water proof surface that looks well and wears well. Varnawax requires polishing and may be used on all floors except asphalt and rubber or other floors harmed by an oil solvent.

SCRUBZOL

A strictly neutral linseed oil cleanser especially developed and approved for cleaning Wood, Linoleum, Cork, Asphalt Tile, Marble, Terrazzo, Travertine, Magnesite, Masonite and other similar floors. Scrubzol is a concentrated product thus permitting a little to go a long way and do a big job—satisfactorily and economically. Don't take our word for it. Try it and prove it to your own satisfaction.

VARNASEAL

You'll find the answer to your Terrazzo and Travertine problems in Varnaseal. Seal these floors against the entrance of dirt, grease, oil, stains and foreign matter with Varnaseal. It is easy to apply, makes maintenance easier and gives your Terrazzo or Travertine the kind of protection needed. Lower your maintenance costs with Varnaseal.

WRITE FOR OUR FREE 1941 FLOOR MANUAL

Below: Gymnasium, Lee Edwards School, Asheville, N. C.
Finished with Selig's JIM KOTE

JIM KOTE

A mighty fine, chemically balanced bakelite and tung oil gymnasium finish. Does not rubber burn, impervious to alkali, salt water, alcohol and common acids. Easily maintained. Plenty of traction. An ideal finish. Our numerous satisfied customers are, we believe, the best judges. Their complete satisfaction makes us believe you also will be pleased. Jim Kote is easily applied by the mopping method.

FLOR-O-SEAL

Especially developed for classroom use. This penetrating seal, when properly applied, does not leave a surface film. Thus, Flor-O-Seal does not show unsightly traffic lanes. It wears well, is easily maintained and is economical. The application is very easy and simple.

FLOOR MAINTENANCE SERVICE

The SELIG trained and experienced floor maintenance engineers are qualified to assist you in any problem of scientific floor finishing and maintenance. They will gladly assist you in setting up the proper and most economical schedule of maintenance. Please discuss your problems with us freely.

We manufacture a complete line of floor maintenance materials and equipment. Our various materials have been approved by the leading makers of flooring materials such as Wood, Linoleum, Cork, Rubber and Asphalt Tile, Marble, Terrazzo, Magnesite, Masonite, etc.

DISINFECTANTS — INSECTICIDES — LIQUID TOILET SOAPS

In addition to the famous line of floor materials, the name SELIG has been synonymous with the highest standards of Disinfectants, Insecticides, Liquid Toilet Soaps and Sanitary Supplies for over forty years.

Put your problems up to us and permit us to offer suggestions and advice. There's no obligation involved and it may be of mutual benefit. Write for our big free complete catalogue.

THE SELIG COMPANY, INC.

DALLAS ATLANTA NEW ORLEANS

Manufacturers of

Floor Finishes — Waxes — Cleansers — Polishes

ESTABLISHED 1896

GEERPRES WRINGER, INC.

Muskegon, Michigan

GEERPRES WRINGERS AND TANKS

Geerpres Wringers and Tank Mopping Units will enable your school janitors to wash and rinse floors quickly and thoroughly.

Geerpres Wringers give long-time service—with no parts to crack or warp—no splash—no rust.

They save the floors—will not mar or scratch when in use.

They preserve the mops by retaining fabric in the soft, fluffy condition most suitable for rapid mopping. No pulling or twisting of mops is necessary to quickly remove the water.

At left—

NEW SUPER WRINGER NO. 2436

Has enclosed double staggered, non-slipping gears; extra long handle with large rubber grips; cadmium plate and durable baked finish; electric arc welded construction. Wrings all sizes of mops from 20-ounce to 36-ounce. Weight 17 pounds. Fully guaranteed. Fits round or square containers

Complete unit consists of wringer, tank and chassis. Width of wringer inside mop compartment $7\frac{1}{4}$", length inside, $9\frac{1}{4}$"; depth of wringer when open, $7\frac{3}{4}$". Height of complete unit to top of handle extended, 39"

They are simple in operation—a downward stroke of the lever extracts the water.

They wring quickly and uniformly—no loose mop strings are left, to catch around legs of furniture. The force is downward upon the mop, the natural way for water to flow.

Geerpres Wringers are available in two sizes, in both single and twin tank units.

All models are equipped with double ball-bearing casters, and have soft rubber wheels. Fully guaranteed.

At right—

NO. 1624 GEERPRES WRINGER

Wrings mops from 14-ounce to 24-ounce. Fits round or square container. Has double staggered gears which cannot possibly side-slip. Made of steel, fully guaranteed. Cadmium plate and durable baked finish

Width of wringer inside mop compartment, 6"; length inside, $8\frac{1}{4}$"; depth, open, $7\frac{1}{2}$". Height of unit complete including wringer handle, 31". Capacity of tank, 32 quarts. Complete outfit—wringer, tank and chassis—weighs 25 pounds

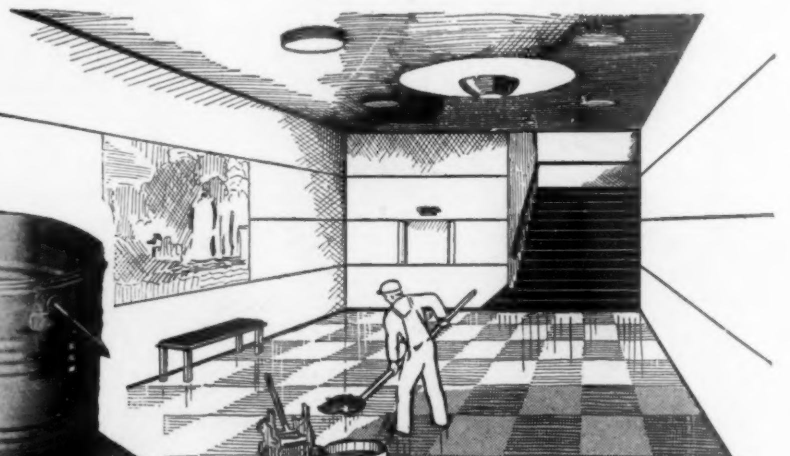


Fig. 2

TWIN TANK UNIT NO. 1624T

Consists of one wringer, two 32-quart removable galvanized tanks, one two-compartment chassis with 24" x 1" rubber bumper on each end. Length 31". Width 17". Approximate weight 47 pounds. Wringer and chassis, cadmium plate and durable baked finish

TWIN TANK UNIT NO. 2436T

Consists of one Super Wringer, two 44-quart galvanized tanks, one two-compartment chassis with rubber bumper. Length 33". Width 18". Approximate weight, 60 pounds. Wringer and chassis, cadmium plate and durable baked finish

ADVANCE MACHINE COMPANY, INC.

Fourth Street S. E. at 26th Avenue, Minneapolis, Minnesota

School Maintenance Engineers tell us often that everything they demand of a floor machine they find in the ADVANCE FLOOR MACHINE!

The fact that engineers themselves, those men who know from personal experience what a floor machine *should* do, endorse Advance machines wholeheartedly as the machines that meet every requirement of a unit of this kind is sound evidence that Advance machines are worthy of careful consideration. Advance machines are constructed with a unique system of interchangeable brushes for scrubbing, steel wooling, waxing and polishing. The interchange of brushes is simple and requires but a few moments.

NOTE THESE 5 IMPORTANT FEATURES

1. NOISELESS. Advance machines are engineered for noiseless operation. Silent gears, rubber motor mountings, etc., make for quiet.
2. LOW. Appreciating that machines must often be used under articles of furniture, ADVANCE machines are of low construction for easy access to difficult places.
3. EASY TO OPERATE. No more difficult than a vacuum cleaner. Advance's scientific, multiple-brush construction prevents side pull while doing a more thorough job.
4. QUICK BRUSH INTERCHANGE. Advance's patented construction makes interchanging of brushes an easy task requiring but a few moments.
5. LONG LIFE. Every advance floor machine is built for many years of regular service. All materials are carefully selected after rigid test. Used in many schools and universities for over ten years.

LOWBOY FIFTEEN

Has a brush spread of 15 inches. Designed for the building where floor space is not large. Does same good job as larger and more expensive models

LOWBOY SIXTEEN

Has a brush spread of 16 inches. Designed for average heavy-duty work in the average size building. Next to largest size made, and built for many years of hard service

FOUR MODELS—FOUR PRICES

There are four different models or sizes for you to select from. Each of these models is on an exact parity in quality with the others. We display a range of four models, however, so that you will find one that will exactly suit your particular requirements and your budget.

COMPLETE SPECIFICATIONS AND PRICES ON REQUEST

Write us today for our illustrated folder giving complete details and specifications with prices on each of the four Advance floor machines. Investigate Advance machines carefully before you select any machine. Your request will have our immediate attention, and our representative nearest you will be glad to give you a complete explanation and a demonstration.

THE KENT COMPANY, INC.

174 Canal Street, Rome, N. Y.

BRANCHES IN PRINCIPAL CITIES

FLOOR MACHINES—For Thorough, Speedy School Floor Maintenance

The appearance of your school building is much improved when your floors are kept in good condition. With the swift, economic, and efficient methods of modern maintenance, it is easy to preserve and keep your floors looking their best. New types of floors requiring special treatment, as well as old floors, are speedily and thoroughly cared for by machines designed to do this work. There is a Kent Floor Machine for every size and type of floor. Increasing number of schools using these speedy efficient Kents over a period of 27 years testifies to their popularity for such purposes as scrubbing, waxing, polishing, buffing, sealing, and sanding. One of the Kent Machines, the Model C15, is shown below. This all-weight-on-the-brush machine combines the principles of the patented off-set motor design for perfect balance and ease of operation, straight-line drive for the minimum number of moving parts, automobile gear construction, fully enclosed dust and water-proof motor, and patented adjustable safety-switch handle. These sturdy machines, made in eight sizes, will give you many trouble-free years of service.

ELECTRIC MOPPER (Dirty Water Pick-Up)—Equipment to Clean and Preserve School Floors

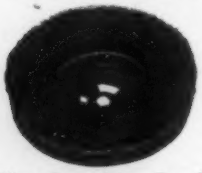
Added to the line of school maintenance equipment is the increasingly popular Electric Mopper. This machine was designed to save cleaning time, to protect your floors and your investment in your floors. Dirty scrub water cannot be left to seep into cracks and crevices or to leave small dirt deposits which are ground into your floors after drying as was the case in the old method of mopping. Throw away your mops. You will cut down many hours of cleaning time, insure faster drying and be confident your floors, even the cracks and crevices are thoroughly clean with the modern principles of vacuum pick up. The Kent Electric Mopper is an easily portable machine, has a powerful suction, and is built for servicing your school. You will be confident of cleaner floors, a better appearance to your building and easy disposal of the dirty, germ-filled scrub water in the shortest possible time.

SUCTION CLEANER—Vacuum Cleaning for Speed and Efficiency

Vacuum cleaning has replaced the old push-broom method of cleaning the school room. Dirt that was formerly pushed into little piles or scattered into the air to settle after cleaning is now vacuumed into a tank to be taken up and out of the building. Maintenance hours are cut down and budgets can omit the purchase of many brooms. The Kent Suction is a small powerful unit, easily portable by one man into any part of the building. Dirt is suctioned up for complete disposal into a tank which is easily removed by a slight twisting motion. Erasers are thoroughly cleaned by quick application to a special tool on the machine. Draperies, shades, and library books are easily cleaned without removal. Sturdy build and twenty-seven years' experience in their application insures minimum repair costs on these machines.

THE KENT REPUTATION

has been built upon the satisfaction of thousands of users in all types of buildings in all parts of the world. One famous university has more than 25 machines to take care of their needs (name on request). For over 27 years, KENTS have proved their quality by their performance.



Fibre Scrubbing Brush for wood, linoleum and similar floors

Stiff Waxing Brush for waxing all floors

Soft Polishing Brush for polishing waxed floors

Steel Wire Brush for heavy scrubbing and refinishing

Lamb's Wool Buffing Pad for routine rejuvenation

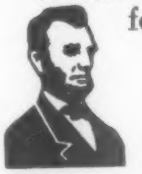
Sandpaper Disc for sanding wood, cork and similar floors

Write for illustrated circulars giving further details

LINCOLN-SCHLUETER FLOOR-MACHINERY COMPANY, INC.

World's Manufacturer of The Most Complete Line of Floor Maintenance Equipment for Wood—Tile—Linoleum—Terrazzo—Marble—Asphalt Tile—Cork—Rubber—Concrete and All Floor Materials

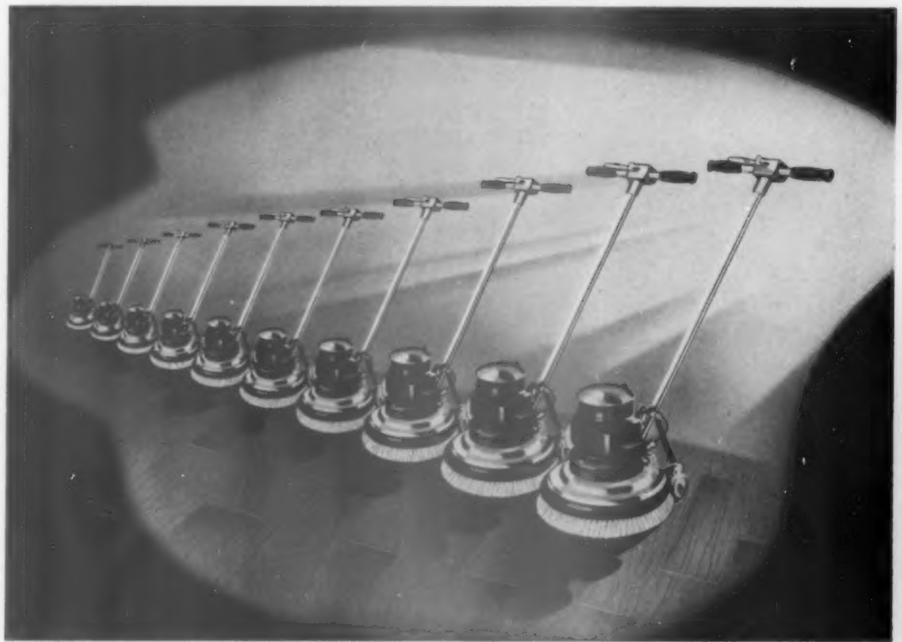
540 South Peoria Street ★ Chicago · Illinois



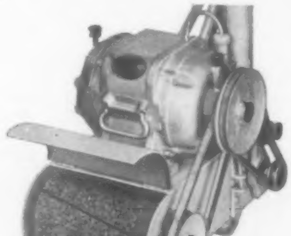
★ The Lincoln Method of Floor Maintenance is based upon a most exacting analysis of your school or college floor requirements, given without cost or obligation by the local Lincoln floor maintenance man in your territory.

It offers a unified maintenance plan which includes the correct equipment (selected from Lincoln's more than 50 models), together with expert recommendations of cleaning and finishing materials, which, when used with Lincoln equipment, will maintain bright, spotless surfaces, meanwhile protecting and preserving your valuable floors and floor coverings from damage or depreciation.

Consider the Lincoln Method first. For Lincoln provides a most comprehensive line which enables our representative to meet your requirements with a guarantee of performance and excellent results backed by more than 45 years of manufacturing and floor maintenance experience.



Reading from left to right: The Lincoln SD10—SD11—SD12—SD13—SD14—SD15—SD16—SD18—SD20—SD22



The Lincoln MULTI-PURPOSE

5 Important Floor Maintenance Operations with One Machine.

Adaptable to a wide variety of floor maintenance uses, all necessary to the proper preparation and care of school and university floors.

1-SANDS newly laid floors, or floors in need of refinishing to satin-smooth surfaces.

2-WAXES and POLISHES wood, linoleum, tile, marble, composition, concrete and terrazzo floors to bright, gleaming surfaces. Takes but a few minutes to change drums for each operation.

3-STEEL WOOLS oiled or sealed floors. Removes all grit and grime, maintains the lustre and beauty of waxed and polished floors.

4-BURNISHES SEALS

5-BUFFS - classroom, gym and hall floors to a beautiful ballroom finish.

MORE THAN 50 MODELS IN THE LINCOLN LINE
REPRESENTATIVES IN ALL PRINCIPAL CITIES

The Lincoln Single-Disc Line of SCRUBBERS and POLISHERS

TEN MODELS of Lincoln Single Disc machines enable the Lincoln representative in your territory to provide the correct capacity machine that will meet your floor maintenance requirements **exactly**. No guesswork. You never get under-powered equipment that falls short of doing the job. You never get an over-powered machine that uses excessive soaps or wax, or one that can damage or depreciate your valuable floors or floor materials. Anyone can efficiently use them. Total weight of motor is directly over the brush for perfect balance, simplifying directional control. No whip, wobble, sway or pull. Very fast, efficient and quiet. Scrubbing—waxing—polishing—steel-wooling discs are obtainable and are interchangeable on single and twin-disc machines. Write for special circular.

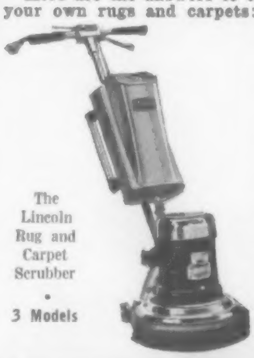
Lincoln Twin-Disc SCRUBBERS and POLISHERS

Clean, streakless, efficient, low-cost scrubbing and polishing of school and college floors are the prime essentials. Where twin-disc machines are recommended for greater coverage, it is highly important that both brushs interlock to eliminate streaking. Lincoln Twin-Disc brushes do **interlock** and do **eliminate** streaks. Moreover, Lincoln Twin-Discs provide a maximum of brush speed, yet require a minimum of motor capacity. Illustration shows how the motor is scientifically placed, so that all the weight is divided equally over both brushes. Low in brush cost—quiet in operation—furnished in 10 Models No. 11—16—20—21—32—45—50—77—78 and 450 for every floor requirement. Write for special circular.

Typical Lincoln Twin-Disc Scrubber and Polisher

The Lincoln Line of RUG and CARPET Scrubbers

Here are the answers to the questions you're asking about scrubbing your own rugs and carpets:



The Lincoln Rug and Carpet Scrubber

•

3 Models

Q.—Can rugs and carpeting be cleaned right on the floor?
A.—Yes.
Q.—What size rugs can be cleaned this way?
A.—Any size.
Q.—Can rugs be cleaned at night and used next morning?
A.—Yes. It requires only 5 to 7 hours for rugs and carpeting to dry.
Q.—Is it necessary to hire a rug cleaning expert to operate a Lincoln Rug Scrubber?
A.—No. Any man can clean rugs with a Lincoln machine by reading and following our simple instructions.
Q.—How long does it take to clean a rug or carpeting size 9' x 12'?
A.—Approximately ½ hour.

Weighs Only 16½ lbs.

The Lincoln Portable Dustless Disc Sander

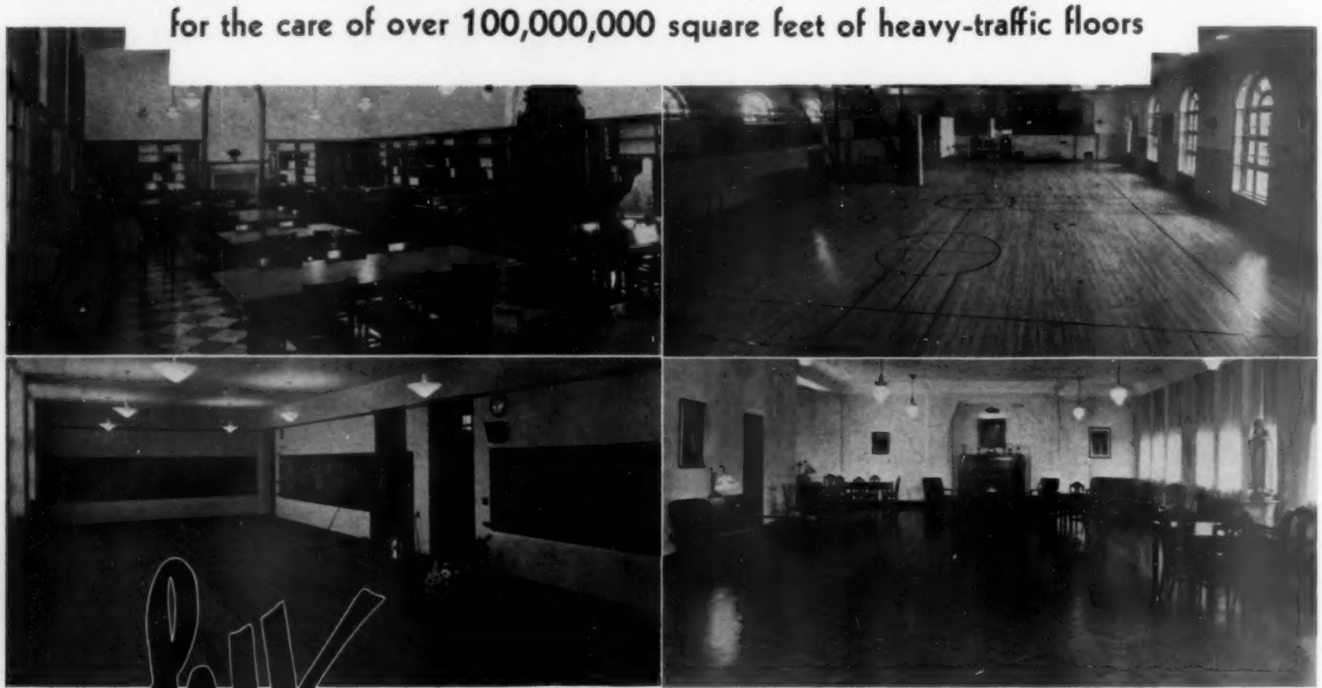
Sands desks, table-tops, window sills, stair treads. For manual training and resurfacing blackboards.

G. H. TENNANT COMPANY

Established 1870

General Office and Factory: Minneapolis, Minn.

The TENNANT SYSTEM is today used throughout the United States and Canada for the care of over 100,000,000 square feet of heavy-traffic floors



Why this universal demand for THE TENNANT FLOOR MAINTENANCE SYSTEM?

- This modern method of dry cleaning wood floors keeps them smooth and hard surfaced. Thus, they will wear remarkably well and remain easy to sweep with a cotton mop.
- Tennant maintained floors reflect light and have a sanitary, homelike cleanliness. This is conducive to orderliness on the part of the students.
- Partial refinishing in traffic areas can be done without showing lap marks. Therefore, floors always retain a uniformly attractive appearance. Resanding and oiling are never required.
- Asphalt tile, linoleum and cork floors can be cared for equally well with the Tennant System.
- This easily operated maintenance program is both economical and efficient. Floors are improved in condition and appearance with continued use of the Tennant System. A demonstration of our process as applied to the care of your floors will convince you of its merit.
- Tennant floor maintenance equipment is practical. In addition to serving as a cleaning machine, it provides a speedy, systematic method of finishing new floors and reconditioning old floors.
- The Tennant floor machine operates flush with the wall, has a cylindrical drum that revolves at 800 r.p.m. for burnishing work and 1400 r.p.m. for sanding. This drum rotates in either direction.
- Wax application and polishing can be completed in one rapid operation. Other attachments convert the same machine into a sander, steel wool burnisher and scrubber. The attachments are easily changed without using tools.
- The Tennant machine is equipped with vacuum for collection of dirt, dust and steel wool fragments.
- Trained factory representatives will instruct your operators in proper use of Tennant equipment. They are experienced in all types of floor work and can assure you of the same fine results secured by other users of the Tennant System.

The way to finer floors **TENNANT** *Floor Maintenance System*

THE MURALO COMPANY, INC.

Decorative Wall Coatings, Casein Paints, Calcimines, Texture Paints
Water Paints, Wall Paints, Cement Paints, Wall Sizes and Patching Plasters

576 Richmond Terrace, Staten Island, N. Y.

Cambridge, Mass., 200 First Street
Chicago, Ill., 2624 W. Lake Street

Los Angeles, Calif., 4890 Pacific Boulevard
San Francisco, Calif., 447 Hampshire Street

NATION WIDE DISTRIBUTION

MURAL-TONE — A CASEIN WALL AND CEILING PAINT IN PASTE FORM

Mural-tone meets every decorating requirement—speed, beauty, economy, and durability. It is a high grade casein paint made according to a scientifically balanced formula. The principal pigments used are remarkable for their extraordinary opaqueness and brilliance. The clear, colorless, vehicle, compounded from casein, is characterized by toughness of film, strong adhesive qualities and non-yellowing properties—insuring clarity and permanence of color.

Once Mural-tone is applied the film remains in sound condition and no treatment of surface is necessary when Mural-tone or any other decorative material is applied at some future date.

Ideal for Unseasoned Plaster and Masonry

Mural-tone can be applied to fresh unseasoned plaster and masonry immediately after they have hardened (usually 48 hours), as it possesses the right degree of porosity to permit the escape of moisture and the free passage of air essential to the proper curing of the surfaces. All colors are permanently limeproof and alkaliproof. For *new* construction or *old* surfaces we believe there is no finer paint.

Mural-tone Exceeds Government Specifications

Mural-tone conforms to—in fact exceeds—the requirements for interior cold water paste paint set forth in Federal Specifications TT-P-23A, Type 2, issued by the U. S. Government.

Special Advantages

(1) **Beauty**—Rich, matte finish, clear in tone.

(2) **Speed**—Dries in less than an hour, permitting two-coat work, if necessary. Has no unpleasant paint odors.

(3) **Economy**—No costly thinners necessary. Permits savings in time and labor.

(4) **Remarkable Opacity**—One coat covers and hides on most surfaces.

(5) **Exceptional Coverage**—One gallon of paste thinned to brushing consistency will make 1⅔ gal. of paint, covering and hiding (depending upon surface conditions) as high as 1000 sq. ft., one coat, as shown by the following:

Smooth plaster	750 to 1000 sq. ft.
Oil or flat oil painted surface	750 to 1000 sq. ft.
Plaster board	450 to 600 sq. ft.
Rough concrete	300 sq. ft.
Brick	350 sq. ft.
Insulating board	250 sq. ft.

(6) **Intense Whiteness**—A brilliant white that will not yellow with age, and clear tints that will retain their color indefinitely. Exposure to strong light or darkness will not cause fading or graying. Acid fumes, vapor and heat will not affect it.

(7) **High Light Reflective Value**—Due to the high index of refraction of the pigments used in manufacture, in combination with clear, colorless casein vehicle, Mural-tone rates a high light reflective value—white averaging 90% plus.

(8) **Cleansable**—Water, a mild neutral soap and soft sponge are all that are necessary to clean the painted surface.

Colors

Color range includes a brilliant white, 10 beautiful pastel tints, 17 Mural-tone Positive Colors and black. An endless variety of colors can be easily obtained by intermixing. Intermixing charts will be sent you on request.

Mural-tone Positive Colors—Finely ground, concentrated colors in casein vehicle, especially developed for tinting regular Mural-tone White and other casein-vehicle paste paints.

Positive Colors can also be used full strength, alone or intermixed, where strong, brilliant effects are desired. Because of their high tinting strength they are very economical. They produce clear tints of unusual brilliancy.

MURAL-TONE MASONRY PAINT

A Masonry Paint in Paste Form for Exterior and Interior Surfaces

Mural-tone Masonry Paint is designed for the decoration and protection of outside and inside masonry surfaces, particularly concrete, stucco, brick, stone and other similar surfaces. It possesses superior weathering qualities, high opacity and remarkably easy brushing and application. It may be applied to "green" concrete as well as directly to "green" plaster. It may also be applied over oil paint which is in good condition, and adhering firmly. Oil paint may be applied over Mural-tone Masonry Paint.

Mural-tone Masonry Paint may be used on surfaces which have been painted with cement paint, provided that the cement paint is in good condition. Like other Muralo Products, it is prepared for use by simple and easy thinning with water (½ gal. to 1 gal. of paste), and of course involves no fire hazard. It dries to the touch in approximately one hour, and may be recoated the next day. Under reasonably good conditions, one coat is adequate although usually two coats are recommended.

You will at once recognize the versatility and usefulness of this remarkable paint; formulated and built to a standard and quality previously unknown in the Water Paint Field. Upon basis of performance, it is one of the most economical paints obtainable. It comes in 8 tints, and white.

Coverage—One gallon of paste thinned to brushing consistency will make 1½ gal. of paint, covering and hiding (depending upon surface conditions) as high as 855 sq. ft., as shown by the following:

Oil primed plaster	855 sq. ft. (1 coat)	Stucco	370 sq. ft. (1 coat)
B:ick	225 sq. ft. (2 coats)	Cement-asbestos siding	500 sq. ft. (1 coat)
Rough concrete	600 sq. ft. (1 coat)	Cement-asbestos siding	300 sq. ft. (2 coats)

SPACKLE SURFACING COMPOUND

Properly prepared surfaces mean perfect paint jobs that give lasting satisfaction. Spackle is an efficient repair material for filling cracks, holes, dents, joints, and rough grain, and for building up surface irregularities before painting and decorating interior surfaces. It dries quickly to a smooth, hard snow-white surface, sands easily and takes any decorative coating perfectly.

Spackle is packed in handy dry powder form and is made ready for immediate use by the admixture of water. Varnish, white lead or colors-in-oil may be added to make the old-fashioned Swedish Putty.

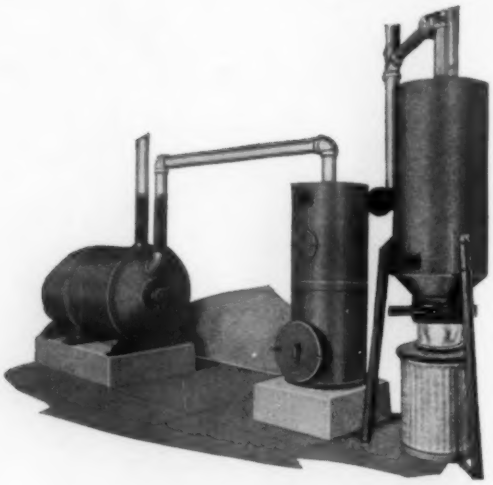
USED IN MANY NOTABLE SCHOOLS

Leading master painters and the operating Heads of schools the country over have used Muralo Process Paint Products for years in the maintenance of important buildings. The following are typical:

Bryn Mawr College
Sarah Lawrence College
Princeton University
University of Cincinnati
University of Rochester
Woodbury's, Los Angeles
University of Minnesota
Union County Vocational School
University of Miami

THE SPENCER TURBINE COMPANY

Hartford, Connecticut



THE SPENCER CENTRAL VACUUM CLEANING SYSTEM

The Spencer Central Vacuum Cleaning System has met with the approval of architects and engineers everywhere, and has been installed in more than 10,000 buildings, including more than 1500 school buildings.

Spencer Central Vacuum Cleaning is a permanently installed system for the speedy and complete removal of dirt and dust from all kinds of floors, walls, ceilings, furniture and other building equipment. It consists of five essential parts, each carefully selected to meet the special requirements for each individual building:

1. A vacuum producer, located in the basement. 2. Inlet valves, conveniently located on all floors and piped to vacuum producer. 3. Specially designed, entirely enclosed, and easily cleaned separator. 4. Light weight, flexible hose. 5. Special vacuum tools for each operation.

Advantages—In exhaustive tests in leading schools, the powerful vacuum, scientifically applied with correct tools, has demonstrated its ability to remove more of the dirt in less time than other methods.

Because the equipment is simple in design, requiring little attention and because these systems are built to provide satisfactory service over long terms of years, both the operating and amortization costs are extremely low.

One janitor can clean twelve average sized class rooms in two hours with a 3 HP Spencer System. The Spencer elbow joint makes cleaning around furniture easy.

For Cleaning Erasers and Chalk Trays—Spencer Vacuum Cleaning, instead of scattering the great bulk of the chalk dust on the floor, provides a method of cleaning erasers and chalk trays that is rapid, sanitary, easy and thorough. The janitor has only to attach a special tool and move it across the surface of eraser or chalk tray.

Cleans the Boiler Room—Spencer Vacuum cleans boiler room floors—removes dust and soot from pipes and draws soot out of the boiler tubes, often saving the whole cost of operation in this one item alone.

Swimming Pool Cleaning Equipment—By means of special cleaning tools usually employed in connection with the pump on the filtering system, it is possible to remove accumulated sediment from swimming pools without the waste of water involved in draining the pool. Bulletin on request.

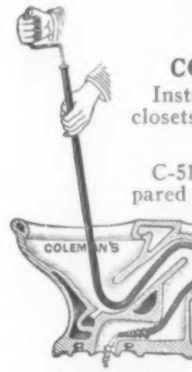
SPENCER PORTABLE VACUUM CLEANERS

The Spencer $\frac{1}{3}$ HP Portable Vacuum Cleaner shown above weighs only 34 pounds. The $\frac{3}{4}$ HP unit shown below weighs 150 pounds. Both are built on the same principles of design as the larger Spencer units, and use the same vacuum tools. Easy to clean, easy to use, and built for long life service.

ALLAN J. COLEMAN

Manufacturers of Sewer, Pipe, Closet and Drain Cleaning Tools

120 W. Illinois St., Chicago, Ill.



Flexible Closet Cleaners

COIL WIRE CLOSET CLEANER

Instantly removes obstructions from water closets, drain pipes, etc.

Grade A

C-510-515. Flexible Coil made of a special prepared **Swedish Spring Steel Music Wire** No. 12 gauge, 1/2" size, with removable corkscrew and cone wire.

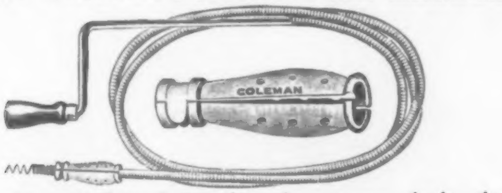
C-510—3-ft. Music Steel Wire Spring $4.50
C-515—6-ft. Music Steel Wire Spring 5.50

Grade B

Made of good oil-tempered steel, 12-gauge wire 1/2-in. size.

C-516—3-ft. coil, black enameled... $3.50
C-517—6-ft. coil, black enameled... 4.50

FLEXIBLE COIL WIRE SEWER AND PIPE AUGERS WITH AUTOMATIC GRIP HANDLE



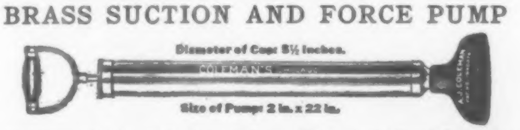
For use in removing obstructions in vacuum, drain pipes or sewers. Made of the best oil-tempered spring steel, and are flexible, enabling them to turn bends and go through traps. Made with cork-screw and handle complete, also furnished with automatic grip handle.

Style No.	Size, Ins.	6-Ft. Lgth.	9-Ft. Lgth.	15-Ft. Lgth.	25-Ft. Lgth.	50-Ft. Lgth.	100-Ft. Lgth.
C-520a	3/16"		$1.25		$2.25	$3.80	$6.80
C-520b	1/4"		1.55		2.70	4.25	7.65
C-520	3/8"	$2.00	2.70	$4.50	6.75	10.20	17.00
C-525	1/2"	2.25	2.90	4.95	7.20	12.75	21.25
C-528	5/8"			5.85	8.10	13.60	25.50

	Price
C-530—3/4", 10-ft. sec., hdl. and corkscrew	$5.50
Extra 10-foot section	5.00
C-535—1", 10-ft. sec., hdl. and corkscrew	6.50
Extra 10-foot section	6.00

Nos. 530 and 535 are furnished with handles and corkscrews and all connections. Made in 10-foot sections.

BRASS SUCTION AND FORCE PUMP

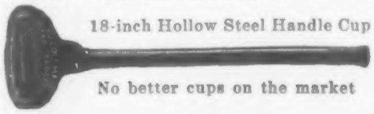


Large reversible Rubber Cup. Fits any opening up to 5 inches. Wonderful article for opening sinks and drains.

C-500—Pump with Cup. Weight, 6 lbs. ....Each $12.00
C-505—Cup only. Weight, 1 lb. ....Each 1.50
C-508—Graphite packing rings ....Per set 1.50

SUCTION AND FORCE CUPS

High grade rubber. All handles secured to Cup by threads and sockets.

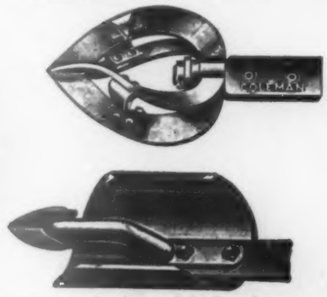


18-inch Hollow Steel Handle Cup

No better cups on the market

Style No.	Size, Ins.	Color	Wood Handles, Ins.	Price Per Doz.
C-545	5 1/8	Red	Steel 18	$24.00
C-550	5 1/8	Red	Cup Only	18.00
C-555	5 1/8	Red	Wood 30	15.00
C-560	5 1/8	Black	Wood 30	12.00
C-565	4 1/2	Red	Wood 30	9.00
C-570	4 1/2	Black	Wood 30	7.80

Giant Revolving Sewer Cleaning Spear Points and Root Cutters



For cleaning out straight sewers or drains. Made of a special oil-tempered, flat spring, steel wire. Equipped with spear point, roller ball and grip handles, which increases efficiency. Use either end.

Style No.	Size, Ins.	25-Ft. Length, Each	50-Ft. Length, Each	*75-Ft. Length, Each	*100-Ft. Length, Each
C-532	1/8 x .030	$1.25	$1.75	$2.50	$3.50
C-534	3/16 x .030	1.50	2.50	3.50	4.50
C-536	1/4 x 1/16	1.85	3.50	5.00	7.00
C-537	1/2 x 1/16	2.40	4.50	6.00	8.00
C-538	3/4 x 1/16	4.00	6.00	8.00	10.00
C-539	3/4 x 1/8	6.00	8.40	12.00	16.00
C-539a	1 x 1/8	7.00	10.20	13.80	18.90
C-540	1 1/4 x 1/8	7.20	10.80	14.40	20.00
C-542	1 1/2 x 1/8	8.40	12.00	18.00	24.00

* Furnished with Frame. Other lengths, 75 cents extra.

CONDUITS AND SEWER RODS WITH NEW FRICTIONLESS COUPLING

C-543—COLEMAN'S SECTIONAL SEWER AND CONDUIT RODS are made of the best grade of 1 1/8" hickory, 3 ft. or 4 ft. lengths, coupled together with Coleman's latest Most Improved "FRICTIONLESS" 1 1/8" Certified Malleable Iron Couplings.

Experience has taught us that there is a great amount of friction and drag caused by the Couplings and Rod dragging flat on Pipe.

Repeated tests have caused the development of COLEMAN'S "FRICTIONLESS" COUPLING. Rods touch on four wings or planes on our Improved "FRICTIONLESS" Coupling eliminating this friction and drag to a minimum.

A Heavy Duty Sewer Rod

C-543—Rod with couplings 1 1/8" x 3', wt., 2 lbs............ $1.10
C-543a—Rod with couplings 1 1/8" x 4', wt., 2 3/4 lbs.......... 1.20
C-625—Rod with couplings 7/8" x 3', wt., 1 1/2 lbs........... .90
C-675—Rod with couplings 7/8" x 4', wt., 1 3/4 lbs........... 1.00

Tools for Above Rods. Write for Prices

HYDRAULIC FLUSHER

House Faucet Connection. Standard Size of Flusher for House Plumbing That Gives Results.

This Sewer Flusher is made of several plies of water-tight heavy rubberized fabric which makes it Strong, Durable and Flexible, easy to insert into traps, vents, curved sewer drains or pipes. A very efficient article when it is necessary to wash out pipes or sewers. When connected with strong water pressure, flusher is expanded to size of drain, thereby giving a direct water pressure close to stoppage. Sizes to fit all pipes. Write for prices.

"GUARD HEALTH" By Using COLEMAN'S Tools to Keep Sewer Drains Running Freely and Have Sanitary Buildings

SECTION V

SITE PLANNING—GROUNDS MAINTENANCE

THE LANDSCAPE ARCHITECT'S PART IN THE DEVELOPMENT OF AN ADEQUATE SCHOOL GROUND PROGRAM

By S. HERBERT HARE and DONALD W. BUSH

Hare & Hare, Landscape Architects, Kansas City, Mo.

THOSE who have had occasion to follow the development of school buildings and their surrounding grounds during the past decade or two have good reason to feel that creditable progress has been made in many cities throughout the country. Everyone remembers the typical school building of the past, usually ugly architecturally, and located in the middle of a barren waste of cinders, brick or dust. Often the site was inadequate in size, almost completely ungraded and without any trees or other planting to relieve the bareness. Such a development was naturally a blot on the community, usually reducing property values around it.

In sharp contrast to this is the modern school plant and its surroundings. In driving through almost any progressive community, urban or rural, new schools are usually pointed out as objects of local pride. In addition to evidence of architectural study in the building, well-designed walks and drives, green lawns, and tree and shrub planting, with fenced playfields, all blend into a pleasing picture, a place in which education as a cultural process can properly be pursued. To the casual observer this rapid transformation from the schools of the past seems nothing short of magic, but others realize that such attractive and efficient results were secured only through careful, intelligent planning.

A Problem of Collaborative Planning

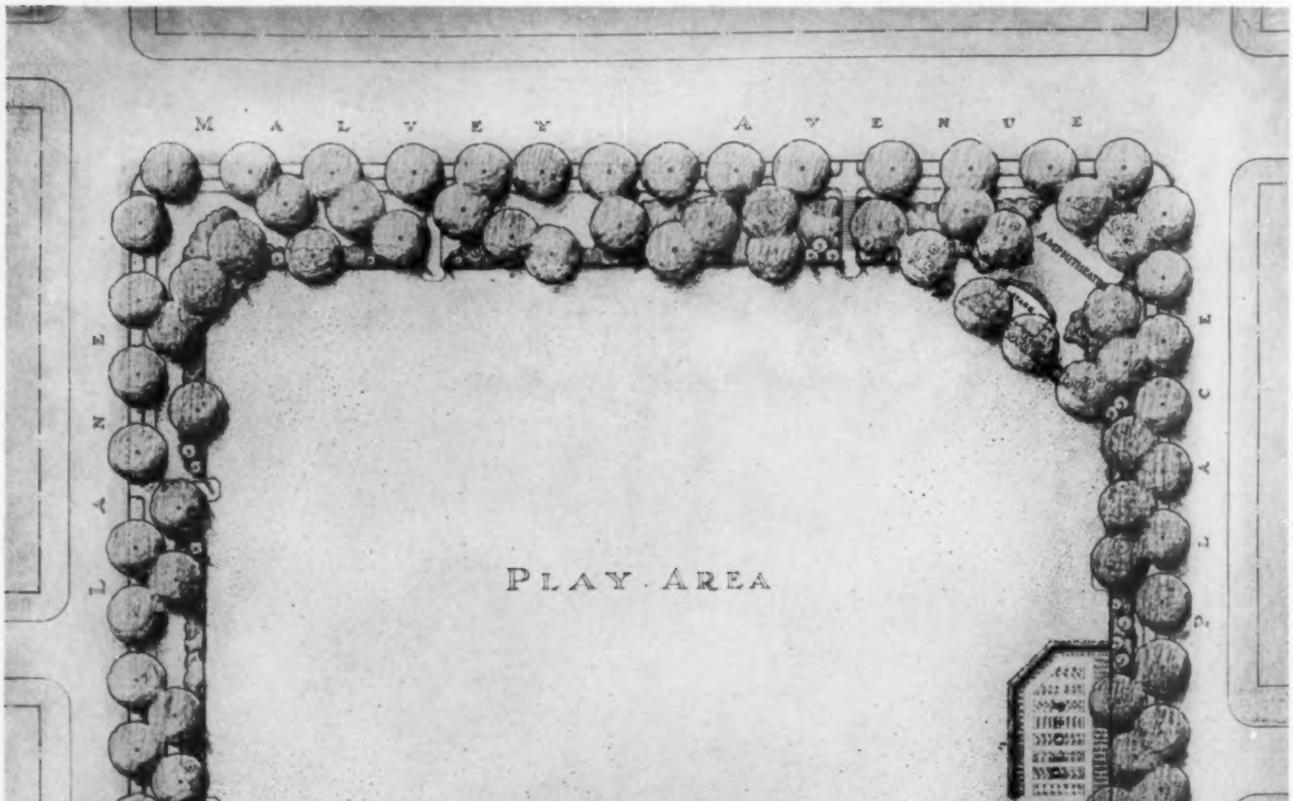
No one agency or profession can claim the entire credit for this dramatic improvement of schools and school grounds. It would not be fair to minimize the value of the parts played by any group, from the members of the Board of Education to the smallest pupil, taught to protect, rather than to destroy, his school property. However, it is only natural that landscape architects take pride in the part their profession has played in the transformation.

The planning of school grounds is more than a planting or beautification project, involving placing a few trees and shrubs along the front faces of the completed building. The problem is much more complex than this, and offers an excellent example of the value of comprehensive planning. The landscape architect can be of service in every step, from the selection of the site, through its development, to the supervision of maintenance after completion. In order to illustrate this, it would perhaps be valuable to explain step by step the procedure that is customary in the development of the grounds which are to be, when completed, an asset to the community.

Selection of the Site

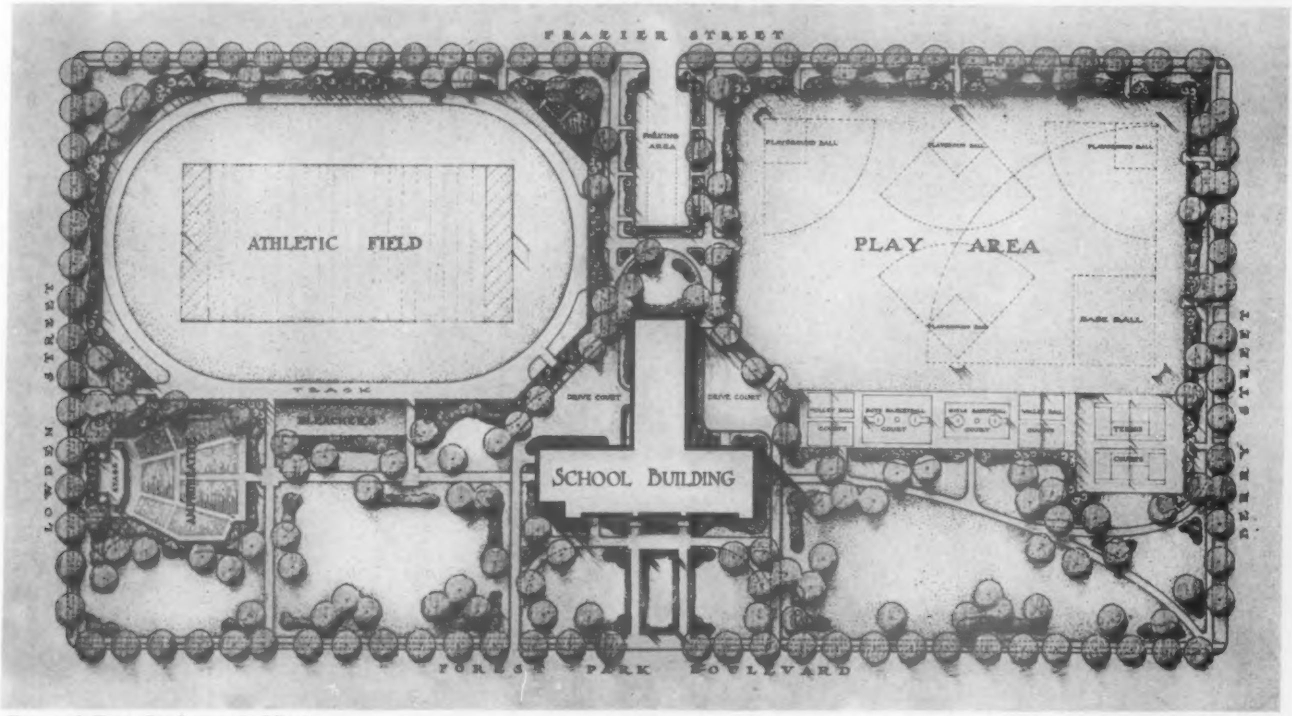
When new school sites are to be acquired, the first logical move is the collection of data to determine the most satisfactory location. Changes in population pattern, and character of the neighborhood, reduction in the size of families, changes in school standards, all have to be considered. A curriculum expert, often an outside consultant, may assemble this information for the consideration of the school executives. A realtor is usually needed to represent the School Board in the appraisal of land values. The City Planning Commission should be consulted in regard to major streets and traffic problems, and perhaps the closing of existing streets in tracts under consideration. The City Engineer can furnish information on paving, walks and utilities. The Park Board is vitally interested in the location of school grounds, since each one of adequate size, properly planned, is actually a

local park and playground in effect. For this reason the location should be studied in relation to existing park areas; and, other things being equal, this factor would influence the choice of site. Playground authorities would be interested in a location and site furnishing space for games most needed in the immediate area. The wishes of the Parent-Teacher Association or civic groups might merit consideration. A landscape architect, in addition to being able to advise about the opportunities for development of the proposed properties is, by reason of his familiarity with these various groups, the logical professional



Hare and Hare, Landscape Architects

An elementary school property of 7 acres with an ornamental foreground for the building, a fenced play field surrounded by an attractive shrubbery border, a kindergarten area, a garden plot and a small amphitheater. (South Hi-Mount School, Fort Worth, Texas)



Hare and Hare, Landscape Architects

A typical example of a complete junior high school property covering about 20 acres and providing, in addition to ornamental foreground and borders, a fenced play area and an athletic field with track, courts for tennis, basketball, and volley-ball, an amphitheater, and parking space for automobiles. (William P. McLean Junior High School, Fort Worth, Texas)

advisor in correlating all their suggestions for the benefit of the school authorities, and in helping them to choose between various sites under consideration. Service of this kind can often relieve the School Board of embarrassment in case of pressure exerted by selfish local interests.

Planning the Development of the Grounds

When the site has been selected, the first step toward planning is the preparation of a topographical survey. This should be carefully done by some competent engineer, in accordance with instructions from the landscape architect. The final plans can be no more accurate than the survey on which they are based. The survey should show land lines, location of curbs, walks, utilities, existing structures and trees, and other physical features of the property, together with grades shown by contours and "spot" elevations at strategic points.

With such a topographical survey as a basis, the landscape architect, working in collaboration with the architect as to building size, form and location, prepares preliminary studies for the development of the site. Often the shape of the area and the existing topography greatly influence the plan of the building, so it is unwise to develop building plans before the plan for the site is studied. These preliminary studies for the ground development form a basis for determining the location of the building and the arrangement of walks, drives, play areas, lawns and planting. The architect, the school executives and the landscape architect should cooperate closely in making the preliminary decisions, so that the ideas of all are represented in the plans to be presented to the Board of Education for their consideration. Sometimes several studies are needed before a satisfactory plan is finally developed.

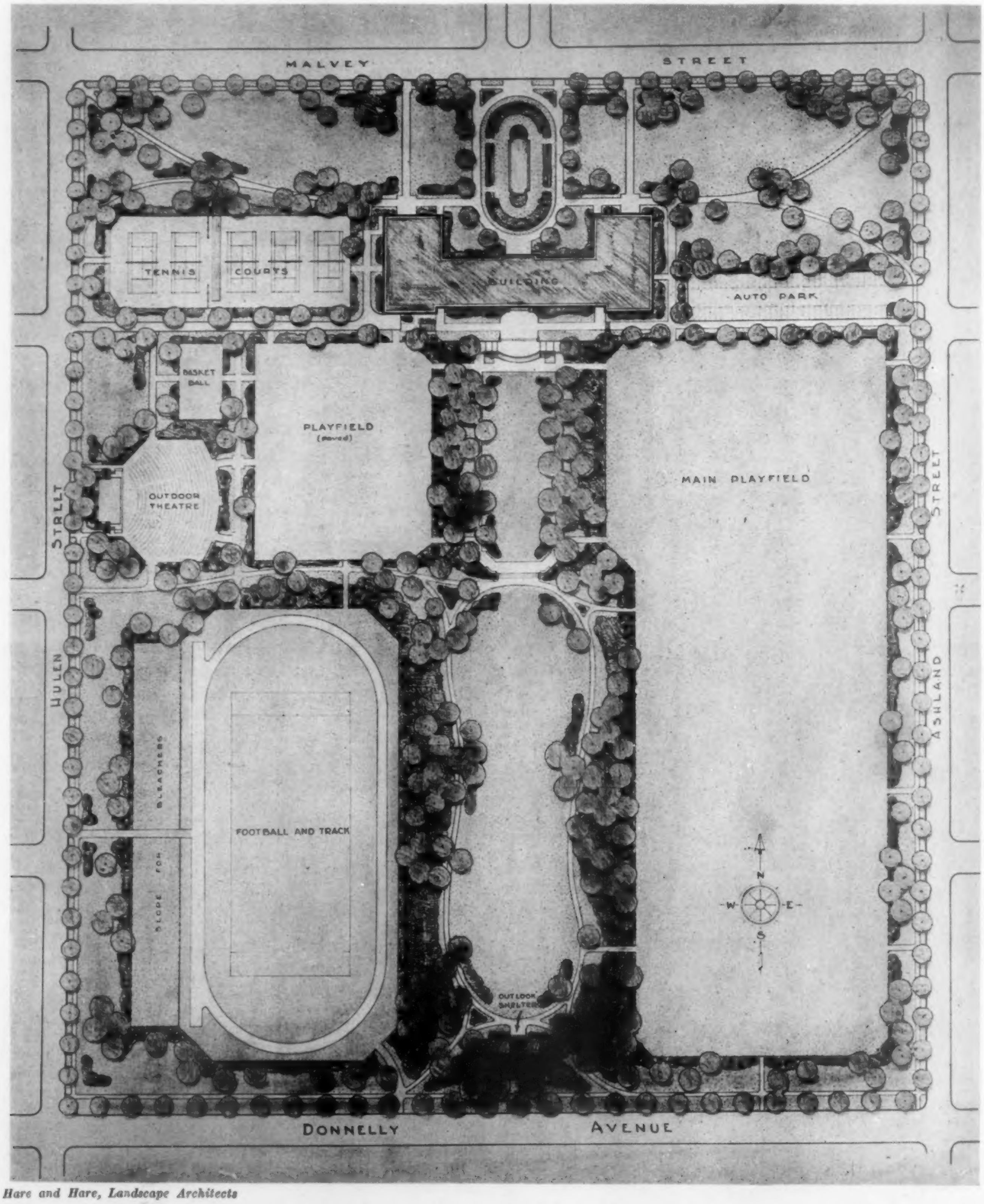
With the approval of the preliminary site plan, the architect can proceed with his building plans, and the landscape architect with the preparation of his working drawings and information, including the dimension plan for exact alignment of walks and drives, and location of other features; the grading plan showing finished grades by contours, "spot" grades, profiles and sections; the planting plan and list indicating the location, quantity and variety of plant material; details for minor constructions such as fences, walls, steps, pools, playground equipment, water supply and drainage; and specifications and necessary contract forms. Of course it will be essential that the architect and the landscape architect collaborate during the preparation of these working drawings, particularly in matters of finished grades around the buildings and disposition of excavated material.

It is often desirable to have these detailed landscape plans finished and approved at the same time as the architect's plans, so that the contract for drives

and walks, and perhaps grading and other ground improvements, can be awarded as part of the building contract.

Supervision of Execution

With the plans prepared and approved and bids submitted, the landscape architect can next be of



Hare and Hare, Landscape Architects

A 32-acre senior high school property on irregular topography providing amply for fenced playfields, track and football field, tennis, basket-ball and amphitheater at various levels, together with ornamental space on the interior as well as in the foreground and around the edges. (Arlington Heights Senior High School, Fort Worth, Texas)

service in analyzing the proposals secured on his work, and in advising the School Board regarding technical details. Knowledge regarding the relative ability and dependability of contractors and subcontractors submitting bids is often valuable in the awarding of the contract.

After work has begun, the landscape architect logically furnishes inspection and supervision of the work covered by his plans. Supervision is even more important in landscape development than in architectural structures, because of the difficulty of showing on drawings many minor refinements that contribute to the finish of the work. Walk alignments and grades should be checked as the forms are being set, and grades of lawn areas adjusted by eye. Soil preparation for lawns and planting beds should be watched, nursery stock selected and inspected, and, finally, contractors' bills checked for approval. Besides securing more satisfactory results, such supervision often results in substantial savings.

When the development of the grounds is taken over by some government agency such as the WPA or the NYA, the checking of bills is of less importance, but in other ways the supervision is even more important than if the work is done under private contract. Foremen as well as workmen are often inexperienced in the type of work assigned them, and must be carefully guided.

Maintenance of the Grounds

When the school building is completed and the grounds developed, another problem still remains. Maintenance is essential to satisfactory results in any landscape project. The average school custodian knows little about the care of the grounds, and often is absorbed by matters inside the building. In a school system having a number of grounds, a traveling crew of experienced maintenance men, with proper equipment, is the most satisfactory solution. If only one school is involved and the area will justify the expenditure, one or more trained gardeners should be employed on a full-time basis during the growing season. If it should be necessary at a small school to require the janitor to care for the grounds, he should have special instruction to fit him for this work. Regardless of the maintenance system, it is advisable to have the landscape architect check the maintenance periodically throughout the year.

A Well-Balanced System Important

In planning school grounds it is important for a city to have a well-balanced system. Some cities plan one or two monumental school buildings with the grounds completely developed, without making improvements on the remainder of the schools in the system. Fort Worth, Texas, on the contrary, developed plans for all sixty-five of her school grounds, some old and some new, and has practically completed in the past six years the actual development of all of them. In school grounds, as well as in parks, the value to the city depends upon the consistent development in all parts of the city rather than a few spectacular examples. Careful planning and budgeting, and the coordination of many kinds of specialized service, make such a system possible. A competent landscape architect, on account of the variety of his training and experience, can render helpful service to the average Board of Education in the handling of such matters.

Thus we see that school grounds do not just happen, but are beautiful and useful only when carefully planned. The results depend not entirely upon the amount of money expended, but upon the vision and judgment of the Board of Education and the soundness of the planning of the varied professional advisors employed by them.

GOOD LANDSCAPE PLANNING PAYS

By A. Carl Stelling

Landscape Architect and Site Planner, New York City

IN contrast with the generations before our time, when one was satisfied to live under the limited conditions then considered normal, school development has moved very rapidly. Educational facilities provided twenty-five years ago are much outmoded today.

Increasing Use of Specialists

This is evidenced by the great school-building program all over the country in progress during the past eight years. Educators and boards of education have, during this period, considered the importance of the service of specialists among landscape-architectural, architectural, and educational consultants in mapping their school-building programs, as highly as they have considered the selection of teaching personnel and school equipment.

This is exemplified particularly in New York State, where the State Department has a very efficient, well-organized Buildings and Grounds Division and Bureau of Physical Education, whose departments coordinate their work. Since practically all school-building construction work is paid for with taxpayers' funds, it seems essential that these citizens be well represented and their money wisely spent. The investment, which generally amounts to hundreds of thousands of dollars, must be safeguarded. A pretty picture in the form of a plan or perspective of a school building and its grounds does not insure good planning of construction and its proper execution and completion. The State Education Department has therefore made a requirement that all plans for such work be submitted to it for consideration and approval. The initial cost of executing a building program appears high, but actually is reasonable when one considers the number of years (at least 40) for which the finished product is expected to stand and be used. From the standpoint of student life, this minimum period of time represents several generations. It is therefore important that any school-building work be done as well and as economically as possible.

Many Considerations Involved

In the case of the Wappingers Central School, New York, the Board of Education has definitely looked to the future. The building is intended eventually to accommodate approximately 1,500 students of kindergarten to senior high-school age. As it stands today, it represents one of the finest and best-equipped structures of its kind ever built in this country, and its grounds obviously must be commensurate with it.

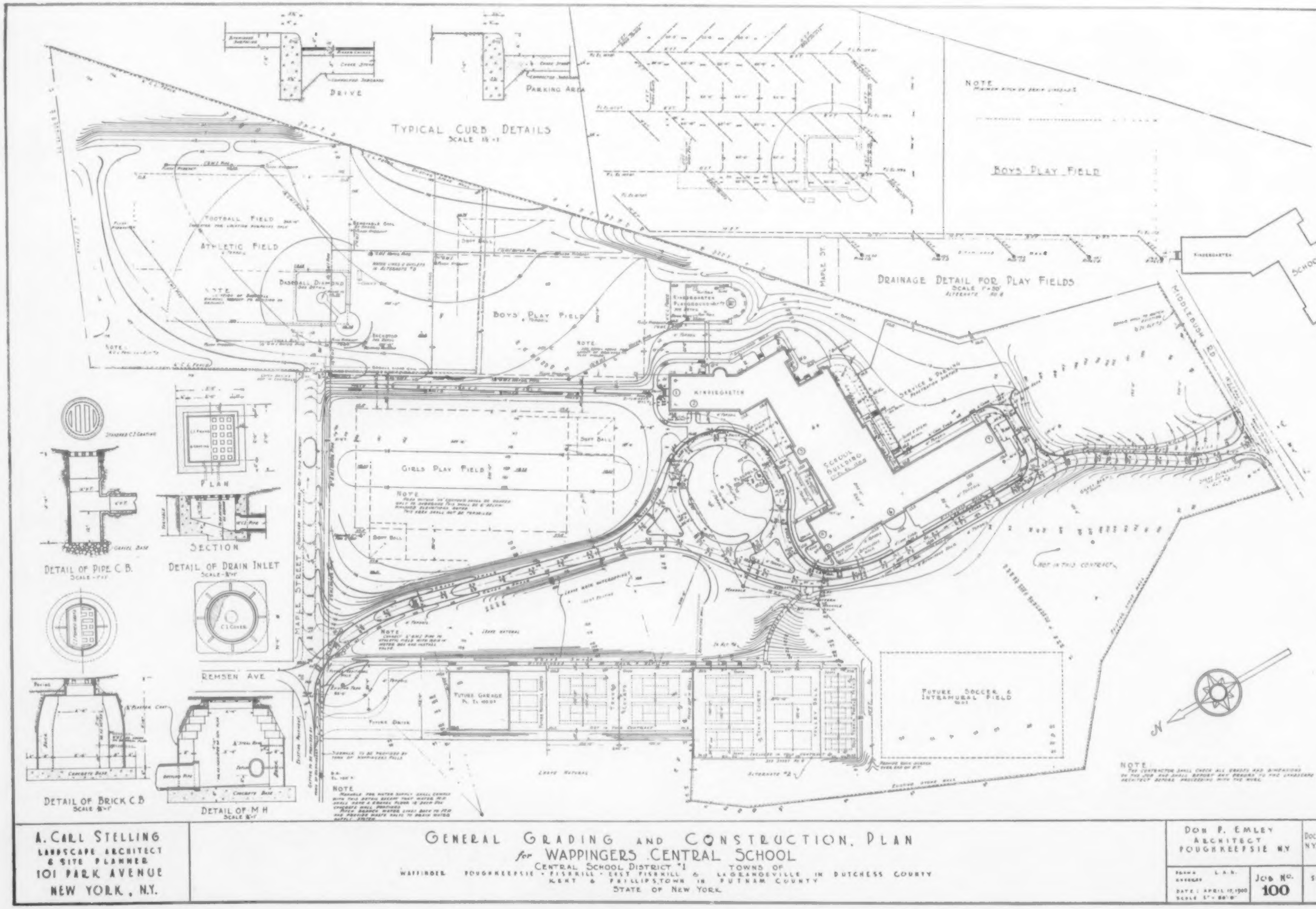
It is situated on a rolling site of about 32 acres. Such an area is not too large, considering the amount of use it will receive by the students and the community. In spite of the size of the grounds, it is necessary to combine various recreational facilities for obvious reasons.

Let us look at the general grading and construction plan and review the land arrangement, and such features of the plan as building location, driveway and parking area, and the various athletic and recreational activities.

Generally, the scope of work represented thereon includes:

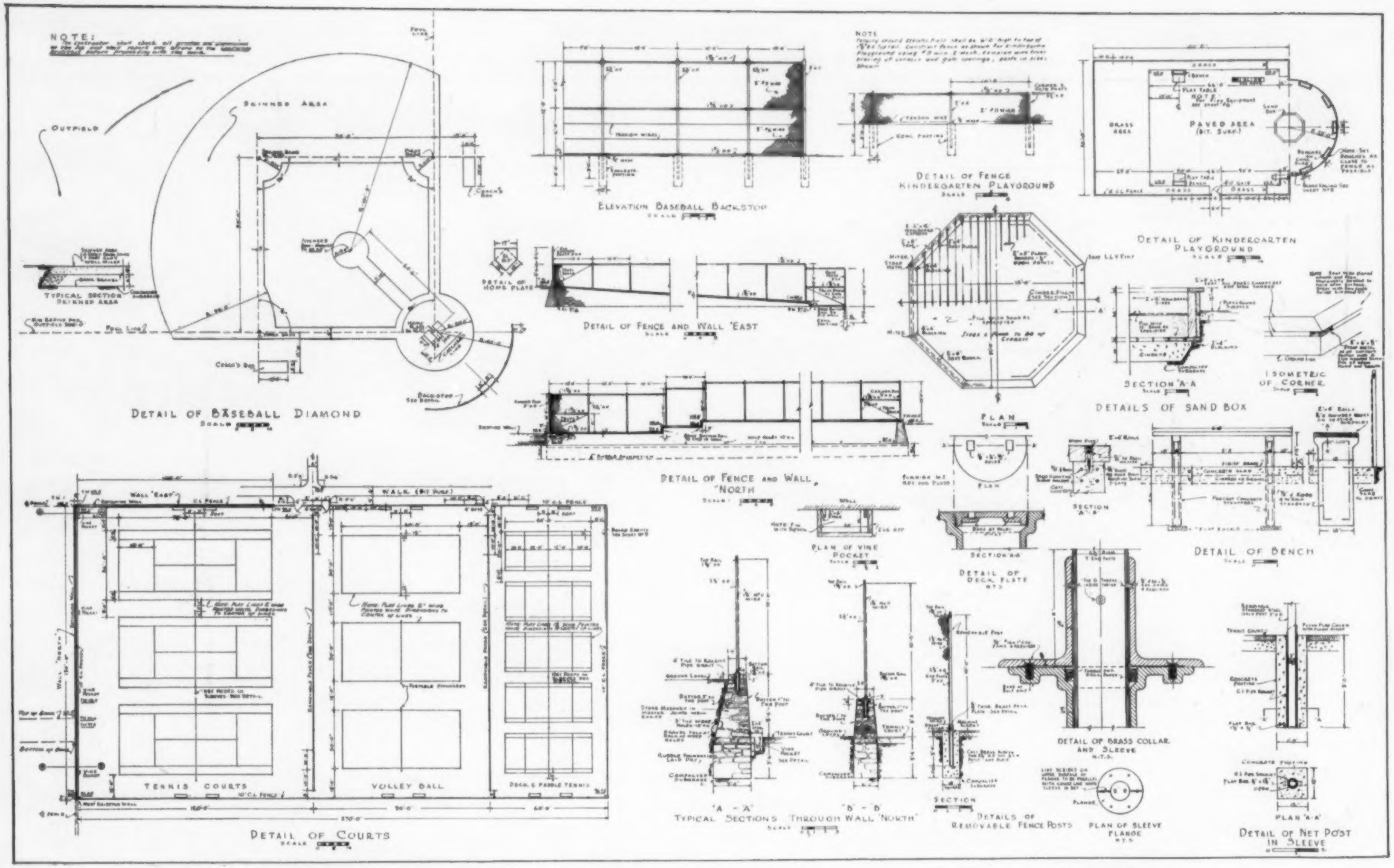
1. Clearing, grubbing, removal of brush, existing walls, etc.
2. Stripping of top-soil
3. Subgrading
4. Installation of drainage, both surface and underground, including pipe lines, culverts, drain inlets, catch-basins and manholes
5. Paving driveways, parking area (profiles not shown), construction of concrete walks, curbs, steps, ramps, platforms, bituminous walks, brick paneling, and edging and stepping-stone walks
6. Kindergarten playground, seats and other equipment
7. Construction of playgrounds, including retaining walls, court resilient surfacing, and installation of game posts
8. Construction of entrance walls and repair of existing dry walls
9. Construction of baseball diamond with backstop
10. Erection of fencing around athletic field area, kindergarten playground and court areas, including removable fence panels (the latter to open for play use during inclement weather and skating in winter)
11. Erection of flagpole
12. Installation of water supply, including hose connections, drinking fountains and connecting pipe lines
13. Replacing top-soil, including existing top-soil, planting, fertilizing, seeding, etc.

It seems possible to execute all this work from the general plan, with the exception of planting. Upon close inspection, however, you will find many important features only vaguely shown. The specifications, if well stipulated, one would think, would cover the missing items, such as construction of concrete walks, curbs, flagpole base, steps, platforms, etc., and the paving for drives, play courts, kindergarten playgrounds, and parking area would be sufficient to build those features. However, one is



"Contract Drawings of General Site Grading and Construction Work"

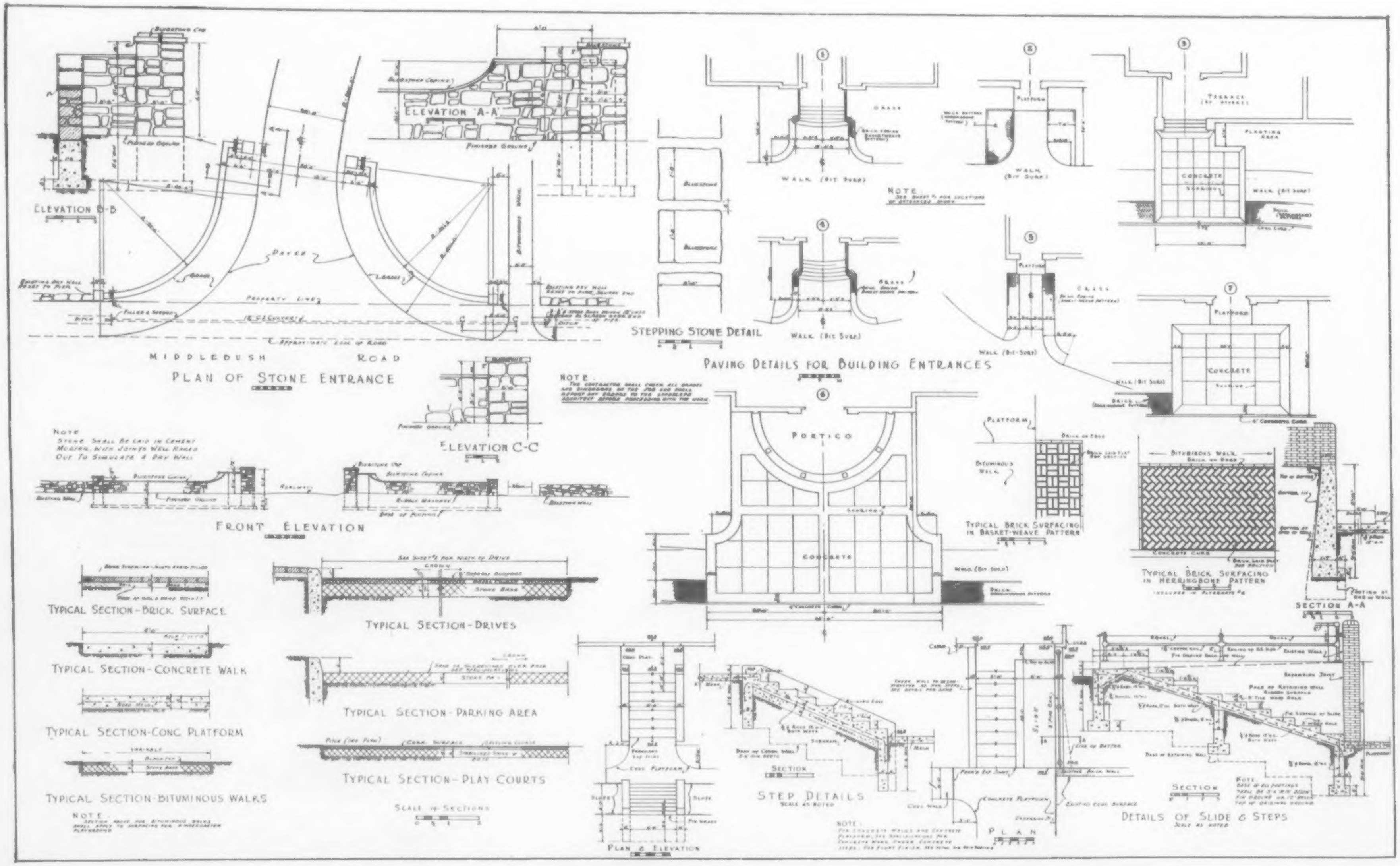
General Plan at small scale (1" = 50') indicates principal features embodied, and work excluded from contract. Planting not on this drawing. Plan indicates building location, general circulatory system, play and recreation areas, new key elevations, existing grades, drains, fences, playground equipment, walls, steps, platforms and all important existing features, taken from an accurate survey map. Some details, at required larger scale, relative to basic work.



"Contract Drawing of Site Construction Details" as applied to Play Court and Recreation Areas. Scale as required

(a) Detail of baseball diamond with backstop indicates standard dimensions for layout purposes, including skinned areas. Section shows type of construction. (b) Detail of play courts with walls, fencing with removable interior fence panels, removable net posts, etc., indicates standard dimensions therefor, type of paving and play lines to be painted white; board edging for flooding purposes in winter; vine pockets against walls. (c) Elevation of backstop; details of fences and walls indicate type of construction for court and playground areas, and illustrate typical changes in height in relation to finished ground elevation and top of wall. (d) Detail of kindergarten playground indicates dimensions of layout; type of paving and grass areas; fencing; location of playground apparatus and benches. (Details of playground equipment not included here except as described under item "e".) (e) Plan and details of sand box, and bench detail, indicate dimensions, type of materials used and construction thereof. (f) Typical sections through wall indicate type of wall construction; i. e., dry rubble foundation; stone masonry-in-mortar above foundation; batter on both back-filled side and exposed side; fence post and sleeve in wall. (g) Brass collar and sleeve of special construction is used for removable fence panels of interior court areas; also net posts. (h) Deck plate covers holes in paving of removed posts.

net posts. (h) Deck plate covers holes in paving of removed posts.



"Contract Drawing of Site Construction Details" as applied to Paved Surfaces and Site Structures

(a) Plan and elevations of stone entrance indicates dimensional relationship of entrance drive and walk with new entrance walls to Middlebush Road and existing dry stone walls. It serves to focus attention to entrance drive. Existing dry stone wall justifies use of stone masonry-in-mortar with raked joints to produce dry effect and continuity of feeling. (b) Paving details for building entrances. Items 1, 2, 3, 4, 5, 6 and 7 indicate relationship, with dimensions, of entrance walks to respective building entrances; type of paving and construction, including paved panels. Where platforms lead to drive, scored concrete is used to accentuate importance. Note brick paneling with grass joints used between bituminous walk and concrete curb of drive. Serves as loading platform for buses; requires minimum upkeep and looks well. (c) Typical paving sections indicate types of paving used and construction method. (d) Plans and elevations of steps indicate dimensional relationship to building and other structures; type of material and construction. Notice reinforcing and footings. Soil conditions dictate type and depth of footings.

interested in obtaining, first of all, a good estimate from a reliable contractor who is to execute this work. In order to enable him to do this, he must have detailed information concerning all the features mentioned. Then there will be no doubt as to how it is to be done, and what the exact construction will be.

Of course everything cannot be illustrated, but the principal ideas in question are shown by the drawing for "Construction Details" and the drawing for "Play Court Details." For example, it is obvious in looking at the "Typical Section Through Wall North" that this is a stone masonry, gravity wall with a rubble foundation laid dry upon a compact subgrade which is at least 3 feet 6 inches below finished grade at any one point. These sections indicate that the wall is intended to be substantial, able to retain the earth on the higher level, support a fence, and not heave when the ground is frozen. It might have been a straight wall with footings embedded approximately a foot underground; which from outward appearances would have looked as well, but would have collapsed within a year or two.

Good driveway construction is also an essential. Our old highways used to heave and form waterholes and ruts because of two basic faults—poor drainage, and poor basic construction. A modern driveway is constructed along the same principles as plywood. It is thoroughly compacted and bound together from subgrade to finished surface course. The same good construction principles apply to all the other features indicated on the detailed plans.

By following these principles, the investment not only pays dividends through the years of use but reduces maintenance to a minimum.

LANDSCAPE ARCHITECTS FOR UNIVERSITY AND SCHOOL PROJECTS

The following directory is restricted to Landscape Architects who are in independent professional practice and have actually been identified with a number of university or school projects.

Space limitations permit only three listings for each individual or firm, and preclude mentioning either the name of the architect associated or the definite character of the work undertaken for each institution. It is believed that the majority of landscape architects specializing in school and university work are here represented, and that many of the projects listed have had a considerable influence on high-grade professional practice in the planning and planting of school grounds and college campuses throughout the United States.

CALIFORNIA

Charles Gibbs Adams, 440 Arroyo Drive, South Pasadena
Pasadena Junior College, Pasadena
University of Southern California, Los Angeles
University of California Arabian Horse Ranch, Pomona

Ralph D. Cornell, 3723 Wilshire Blvd., Los Angeles
Pomona College, Claremont
University of California at Los Angeles
University of Hawaii, Honolulu

John William Gregg, University of California, Berkeley
Campus development for the University of California at Berkeley, Los Angeles, Riverside, Davis, La Jolla and U. C. Hospital, San Francisco

Butler S. Sturtevant, 210 Post St., San Francisco
University of Washington, Seattle, Wash.
Principia College, Elsah, Ill.
Principia School, St. Louis, Mo.

Paul G. Thiene, 728 S. Arroyo Blvd., Pasadena
Alhambra High School, Alhambra
Santa Maria Union High School, Santa Maria
Excelsior Union High School, Norwalk

COLORADO

S. R. DeBoer, 515 E. Iliff Ave., Denver
Arapahoe County School Studies
Mt. St. Gertrude Academy, Boulder
Boulder High School, Boulder

CONNECTICUT

Thomas H. Desmond, Inc., Office of, 1 Drake Hill Rd., Simsbury
U. S. Coast Guard Academy, New London
University of Connecticut, Storrs
Simsbury High School, Simsbury

Joseph F. Whitney, Wilton
Engineering Court, University of Cincinnati, Ohio
School Group, Falmouth, Mass.
Grade and High School, South Dennis, Mass.

FLORIDA

Herbert L. Flint, Post Office Bldg., Winter Park
Rollins College, Winter Park
Junior College, St. Petersburg
Florida Naval Academy, Daytona

ILLINOIS

Robert Bruce Harris, 750 North Michigan Ave., Chicago
Marshfield Senior High School, Marshfield, Wis.
Niles Township Community High School, Skokie
School District No. 69, Cook County

Chance S. Hill, 1333 Maple Ave., Downers Grove
Southern Ill. Normal University, Carbondale
North Central College, Naperville
Northern Illinois State Teachers College, DeKalb

Simonds, West & Blair, 1101 Buena Ave., Chicago
Monticello College, Godfrey
Chicago Latin School, Chicago
Country Day School, Winnetka

F. A. Cushing Smith & Associates, 333 North Michigan Ave., Chicago
Board of Education, High School Athletic Field, Marquette, Mich.
Community Recreation Center, High School Athletic Field, Ishpeming, Mich.
St. Agnes School, Albany, N. Y.

INDIANA

Lawrence V. Sheridan, Brendonwood, Route 15, Indianapolis
Purdue University, Lafayette
St. Mary of the Woods Academy, Terre Haute
Recreation Center, Vocational-Physical Education Bldg., Muncie

IOWA

P. H. Elwood, Landscape Architect's Studio, Iowa State College, Ames
St. Amelian's School, Milwaukee, Wis.
Iowa State College, Ames
Iowa State University, Iowa City

LOUISIANA

William S. Wiedorn, 1305 Jackson Ave., New Orleans
Tulane University, New Orleans
Dillard University, New Orleans
Terrebonne Parish High School and Athletic Field, Houma

MAINE

Beatrix Farrand, Reef Point, Bar Harbor
Yale University, New Haven, Conn.
Princeton University, Princeton, N. J.
Chicago University, Chicago, Ill.

MARYLAND

Joseph C. Gardner, 7110 Clarendon Rd., Bethesda
Woodrow Wilson High School, Washington, D. C.
Woodside Elementary School, Silver Springs
Bethesda-Chevy Chase High School, Bethesda

Irving W. Payne, 4017 Leland St., Chevy Chase
Georgetown Preparatory School, Garrett Park
The Miss Madeira School for Girls, Greenway, Va.
Lanham Grade School, Lanham

MASSACHUSETTS

Robert Washburn Beal, 185 Devonshire St., Boston
Eldon Keith Field, High School, Brockton
Bowdoin College, Bowdoin Athletic Field, Brunswick, Maine
Wellesley High School & Hunnewell Playground, Wellesley

Herbert J. Kellaway, 12 West St., Boston
Andover Newton Theological School, Newton Center
Middlebury College, Middlebury, Vt.
Bread Loaf English School, Middlebury, Vt.

Warren H. Manning Associates, College House Offices, Cambridge
Randolph Macon College, Lynchburg, Va.
Cornell University, Ithaca, N. Y.
Phineas Lawrence School, Waltham, Mass.

Hallam L. Movius, 115 Newbury St., Boston
Bradford Junior College, Bradford
Bowdoin College, Brunswick, Me.
Tilton Academy, Tilton, N. H.

John Nolen, Office of, Harvard Square, Cambridge
Babson Institute, Wellesley
Queens College, Charlotte, N. C.
University of Wisconsin, Madison, Wis.

Olmsted Brothers, 99 Warren St., Brookline
Grove City College, Grove City, Pa.
St. Joseph's College, West Hartford, Conn.
Indiana University, Bloomington, Ind.

Bremer W. Pond, 5 Boylston St., Cambridge
Colby Junior College, New London, N. H.
University of New Hampshire, Durham, N. H.
Southern Methodist University, Dallas, Texas

William H. Punchard, 30 Brookfield Rd., Waltham
Woburn High School Athletic Field, Woburn
Middlebury College, Middlebury, Vt.
Abbot Academy, Andover

Arthur A. and Sidney N. Shurcliff, 11 Beacon St., Boston
Amherst College, Amherst
Mount Holyoke College, So. Hadley
Wellesley College, Wellesley

MICHIGAN

T. Glenn Phillips, Charlevoix Bldg., Detroit
Michigan State College, East Lansing
Starr Commonwealth for Boys, Albion
Michigan College of Mining and Technology, Houghton

H. O. Whittemore, 1920 Norway Rd., Ann Arbor
Ann Arbor Public Schools
Hematite Township School, Amasa
Hartland Consolidated School, Hartland

Raymond Hill Wilcox, Union Guardian Bldg., Detroit
Duns Scotus College, Detroit
Starr Commonwealth for Boys, Albion
Plymouth Public Schools, Plymouth

MINNESOTA

Hugh Vincent Feehan, 1004 Marquette Ave., Minneapolis
St. Thomas College, St. Paul
College of St. Scholastica, Duluth
Tracy High School, Tracy

Morell & Nichols, Inc., 1200 Second Ave., South, Minneapolis
University of Minnesota, Minneapolis
Washington State College, Pullman, Wash.
Carleton College, Northfield

MISSOURI

Hare & Hare, 114 W. 10th St., Kansas City
Northeast Missouri, State Teachers College, Kirksville
Athletic Center and Stadium Setting, Houston, Texas
63 Schools, Fort Worth, Texas

John Noyes, Railway Exchange Bldg., St. Louis
Ladue School, Ladue
Webster Groves Schools, Webster Groves
Lincoln University, Jefferson City

NEW JERSEY

Brinley & Holbrook, 21 South St., Morristown
New Jersey State Teachers College, Trenton
Montclair Teachers College, Montclair
Columbia High School, Maplewood

Michael M. Burris, 485 Engle St., Englewood
Bergen Junior College, Teaneck
High School and Grade School, Mountain Lakes
Grade School, Basking Ridge

NEW YORK

Sheffield A. Arnold, Inc., 101 Park Ave., New York
Manhasset Grade School, Manhasset
East Park Junior-Senior High School, East Park
Middletown High School, Middletown

A. F. Brinckerhoff, 101 Park Ave., New York
Trinity College, Hartford
Millbrook School for Boys, Millbrook
State Training School for Feeble Minded, Southbury, Conn.

Harold A. Caparn, 144 E. 30th St., New York
Manhasset L. I. District No. 6, Manhasset
Lebanon Valley College, Annville, Pa.
Brooklyn College, Brooklyn

Laurie D. Cox, 136 Kensington Place, Syracuse
Whitesboro Central School, Whitesboro
Dundee Central School, Dundee
Chancellor Livingstone School, Hudson

Alling S. DeForest, 16 Fair Place, Rochester
High School and North Street School, Geneva
Villa de Chantal, Rock Island, Ill.
Colgate-Rochester Divinity School, Rochester

Bryant Fleming, Wyoming
Cornell University, Ithaca
Toronto University, Toronto, Canada
District School, Wyoming

Alfred Geiffert, Jr., 101 Park Ave., New York
University of Illinois, Urbana
Hunter College, New York
New Jersey College for Women, New Brunswick, N. J.

Francis Hastings Gott Associates, 920 Merchants Rd., Rochester
East Bloomfield School, East Bloomfield
Brighton School District No. 1, Brighton
Gorham Central School, Gorham

William E. Harries, 110 Franklin St., Buffalo
Belknap School, Lockport
Hawley Area School, Lockport
Mayville School, Mayville

Roeder J. Kinkel Associates, 438 Delaware Ave., Buffalo
Evangelical Training School, Dunkirk
Batavia High School, Batavia
Masten Park School, Buffalo

Charles Downing Lay, 101 Park Ave., New York.
Free Academy, Newburgh
Lenox School, Lenox, Mass.
New York State Normal Training School. Cortland

H. B. Littlefield, "Little Field," North White Plains
Central High School, Hancock
High School and Stadium, White Plains
Battle Hill School, White Plains

William Pitkin, Jr., 2045 East Ave., Rochester
University of Michigan, Ann Arbor, Mich.
Kalamazoo College, Kalamazoo, Mich.
University of Rochester, Rochester

Richard Schermerhorn, Jr., 342 Madison Ave., New York
St. Anthony's Seminary, Catskill
Albany Academy, Albany
Rensselaer Polytechnic Institute, Troy

Jacob John Spoon, 128 Greenacres Ave., White Plains
Academy of St. Joseph-in-the-Pines, Brentwood
Penn. Township School Dist. High School Grounds, Bernville, Pa.
Central School District No. 1, Pine Plains

A. Carl Stelling, 101 Park Ave., New York
Athletic and Recreation Grounds, Bronxville
Mahopac Central School Grounds, Mahopac
Wappingers Central School Site, Wappingers Falls

Thomas Lyon White and Leonard G. Wheeler, Office of, 445 S. Warren St., Syracuse
Cato-Meridian School, Cato
Clyde Central School, Clyde
Hartford Central School, Hartford

NORTH CAROLINA

E. S. Draper Associates, 2038 Beverley Dr., Charlotte
Winthrop College, State College for Women, Rock Hill, S. C.
Lanier Memorial School, Langdale, Ala.
Agnes Scott College, Decatur, Ga.

OHIO

Alexander & Strong, 4500 Euclid Ave., Cleveland
Kent State University, Kent
University School, Cleveland
Mentor Village School, Mentor

A. D. Taylor, 4614 Prospect Ave., Cleveland
Oregon State University, Corvallis
Carnegie Institute of Technology, Pittsburgh, Pa.
Notre Dame College, Cleveland

PENNSYLVANIA

Harry B. Hostetter, Box 566, Lancaster
Reformed Theological Seminary, Lancaster
Linden Hall Seminary, Lititz
Pennsylvania Soldiers' Orphan School, Scotland

Wheelwright & Stevenson, 225 S. 15th St., Philadelphia
The Gunnery School, Washington, Conn.
St. Andrews School, Middletown, Del.
Muhlenberg College, Allentown

VIRGINIA

Albert A. Farnham, 1240 White Oak Rd., Roanoke
Virginia Polytechnic Institute, Blacksburg
Floyd County High School, Floyd County
Warren County High School, Front Royal

Charles F. Gillette, 105 E. Cary St., Richmond
Virginia State College for Negroes, Petersburg
Bennett College, Greensboro, N. C.
St. Catherine's School, Richmond

WISCONSIN

Phelps Wyman, 759 N. Milwaukee St., Milwaukee
State Industrial School for Girls, Oregon
Central and West Grade Schools, Rhinelander
High School, Ashland

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Jackson & Perkins Co., Newark, N. Y.
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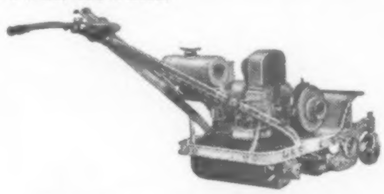
Coldwell Heavy Duty Mowers, with air-cooled Briggs & Stratton motors and equipped with Coldwell Special Gang Units and Sulkies, are the ideal equipment for use on Country Estates, Parks, Parkways, Golf Courses and other large lawn areas. Close, medium and high cuts are made with equal facility by simply adjusting each unit to the desired length of cut. These rugged machines respond quickly to the will of the operator when turning and because of their extreme flexibility they smoothly follow the undulating contours of the lawn surface. Units are quickly and easily attached to or detached from the main power unit. With units detached the machine trims neatly along drives, walls and along the edges and borders of the lawn. The machine illustrated is the popular 25" Heavy Duty Model—30" Heavy Duty Models with Gangs and Sulkies are also available. Write for complete Power Mower Catalog.

COLDWELL CUB REGULAR

A first-rate, all-'round machine with three speeds; single cylinder, water-cooled enclosed motor; oil pump forces oil to engine bearings, cylinders and mechanically operated valves; the ignition, a high-tension magneto specially water-proofed enabling motor to start readily; automotive type carburetor conveniently placed on motor. Width of cut 21". Other Cub models are the De Luxe and Rubber Roller Models. GRASS CATCHERS CAN BE FURNISHED FOR ALL COLDWELL POWER MOWERS.

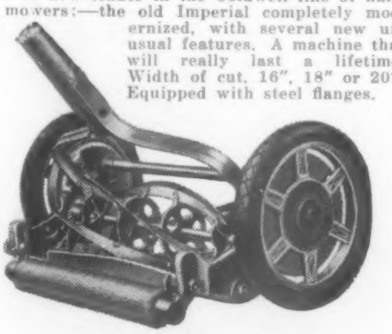


COLDWELL STANDARD 25" MODEL

An extremely useful machine adaptable to many uses. By itself it quickly and easily mows, trims and rolls medium sized lawn areas with a minimum of time and effort. With Coldwell Special Gang Units attached, the cutting width is increased so that the cutting of large areas of lawn is rapidly accomplished. Hand throttle is conveniently located on handle bars permitting complete and instant flexibility of speed at all times as may be required. Dual control provides power both for travelling and cutting. For complete data, write for Power Mower Catalog.

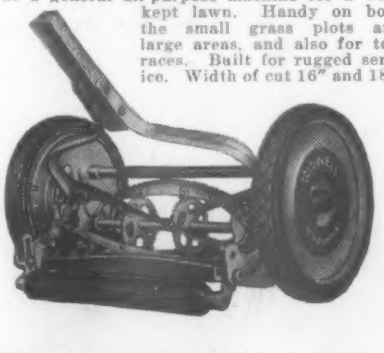
NEW IMPERIAL SPECIAL

A new leader in the Coldwell line of hand mowers:—the old Imperial completely modernized, with several new unusual features. A machine that will really last a lifetime. Width of cut, 16", 18" or 20". Equipped with steel flanges.



DIPLOMAT SPECIAL

A quality hand mower of medium weight, equipped with semi-pneumatic tires. Useful as a general all-purpose machine for a well-kept lawn. Handy on both the small grass plots and large areas, and also for terraces. Built for rugged service. Width of cut 16" and 18".



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An amazing new small power mower built to meet the demand for an extremely low-priced machine. Mows, rolls and trims. Simply constructed, easy to operate. Uses only ¾ gal. fuel per 8 hours. Width of cut, 19". Cut ⅛ to 1¼ acres per day. Recommended for trimming in parks, cemeteries and around schools and campuses. Ideally supplements larger equipment.

COLDWELL BEAR

A sturdy power mower that is easy to handle and makes light work of mowing, rolling and trimming a large expanse of lawn. Cuts evenly and trims close to hedges, shrubbery, trees and walls and along the edges of walks and drives. Air-cooled Briggs & Stratton motor, 21" cut, 5 blades, cuts 2 to 3 acres per day, standard high quality Coldwell construction throughout. A thoroughly dependable machine. Write for folder.

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SUPREME PERFORMANCE

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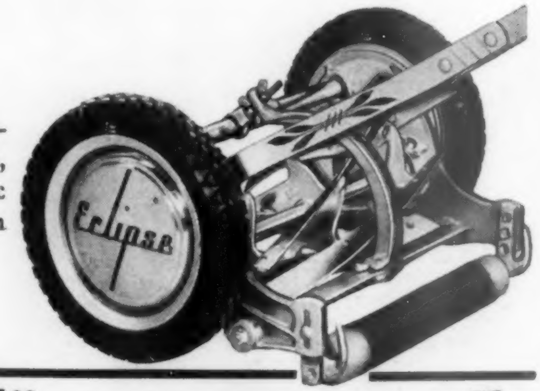
Illustrated — 5-blade, 16″ **$19.50**



21″ CUT

$115.00
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Parkhound

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SPECIFICATIONS

Full 21″ cut. Cuts 2 to 4 acres a day. Briggs & Stratton 4-cycle 1 H. P. motor. Timken, Oilite Bronze and steel bearings. Positive oversize expansion-type clutch. Speed control to suit your pace. Goodyear tires—10½″ x 2⅛″. Ample traction for heavy-duty service. Sharpening device optional. Brings a new effortless motorized mowing to the commercial cutter.

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32″ CUT

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5 TO 7 MILES Per HOUR

SPEED—DOUBLED
ACREAGE—DOUBLED
ECONOMY—DOUBLED

Imagine a 32″ swath; 150 feet long every 15 seconds, actual stop watch time. Positive operator control at these speeds and perfect cutting.

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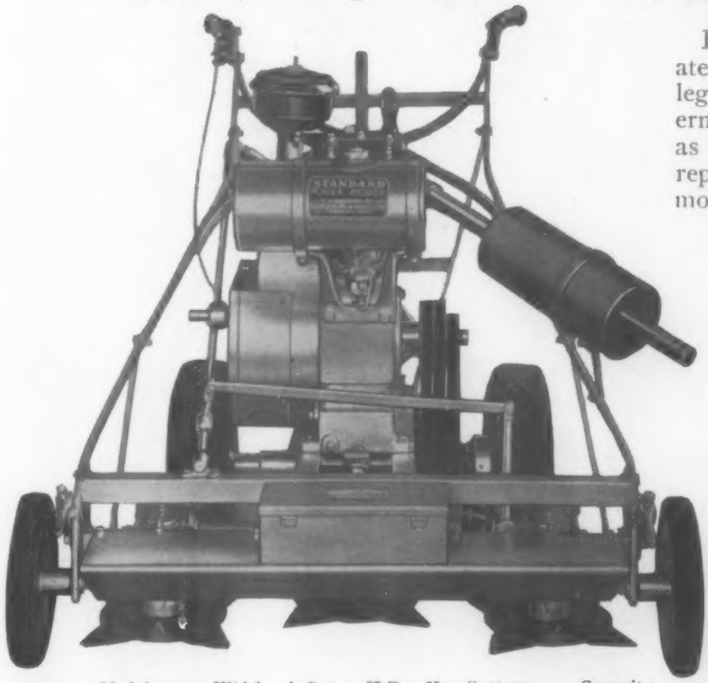
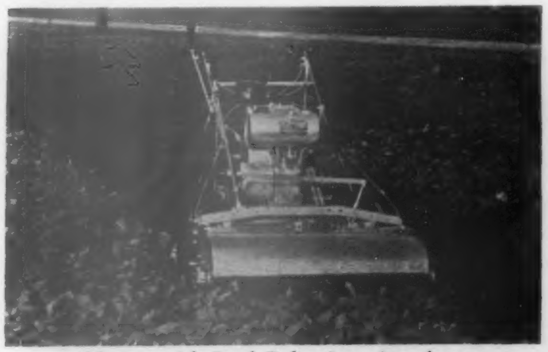


Model	Width of Cut	H.P.	No. Cutters	Capacity
Model A-9	25"	2	2	5- 6 acres
Model AA-9	30"	2	2	6- 7 acres
Model B-9	37"	3	3	7- 8 acres
Model BB-9	48"	4	4	9-10 acres
Model C-9	62"	4	4	10-12 acres

THE STANDARD ROTARY CUTTER

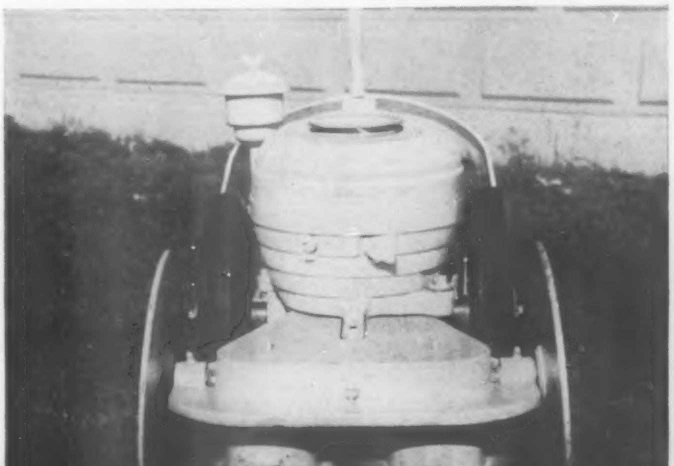
Has been on the market for seven years, and operated under the hardest kind of service. Used by colleges, parks, schools, large estates, cemeteries, Government facilities, etc. Some individual users have as many as 14 of these mowers in use and are still replacing other mowing equipment with Standard mowers. Standard Power mower has been developed into the most versatile cutting device in the field—cutting lawn-grass, dandelion, buck-horn, Johnson grass or any other standing growth without cumbersome attachments. It will cut evenly at any height; permits high mowing.

Leaf Pulverizer attachment is a long desired solution for your leaf problems. Gathers, pulverizes, disperses leaves as a fertilizer for your lawns.



Mower with Leaf Pulverizer Attachment

Large schools, colleges, parks and estates use STANDARD Power Mowers



The "Poynter" Mower

THE "POYNTER" MOWER

The "Poynter" Mower is a mower for mowing in difficult places, such as, under and around shrubbery, on lawn levies, banks, terraces, wooded sections, athletic fields — also for trimming around fences, posts, curbs, trees, and against buildings. Front wheels are on an angle to allow trimming against objects without marring the object; prevent skidding when mowing banks, and to hold the mower level and avoid scalping the ground.

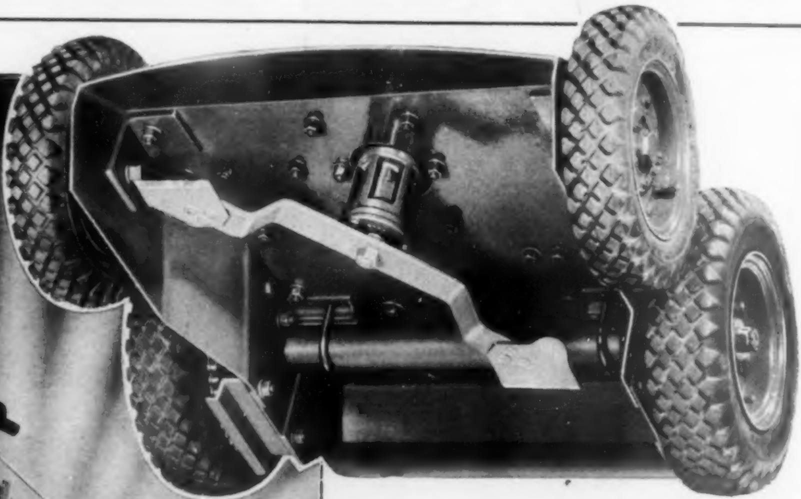
WRITE FOR FULL DESCRIPTION OF ALL STANDARD EQUIPMENT AND DEMONSTRATION BY LOCAL DEALER

WHIRLWIND LAWN MOWER CORPORATION

730 W. Virginia Street, Milwaukee, Wisconsin

• • OWN A WHIRLWIND • •

Rotary Scythe Power Lawn Mower



The past decade has seen the development and acceptance of a new and more efficient grass cutter, the rotary scythe. It does a bigger job.

The first one was a WHIRLWIND

WHIRLWIND Power Lawn Mowers continue to pioneer this development and today offer the best that wide experience, engineering skill and sound management can produce.

● The mere mowing of lawns or cleaning rough areas with power is only the elementary duty of a WHIRLWIND POWER LAWN MOWER.

A versatile machine, its superiority over all others becomes more and more apparent with the passing of each year.

WHIRLWIND

Whirlwind's exclusive application of suction to the rotary scythe is a potent advantage that enables cutting right up to any obstruction without hand trimming, aids in reducing grass clippings to a finer than ordinary mulch, leaves no flattened spears or straggling weeds to rise and mar the lawn's appearance, lifts and crops short spreading growths that would deflect sun and rain from grass roots.

Other advantages that merit your investigation are: adjustable cutting level—low maintenance cost (you can sharpen blades yourself in five minutes)—low operating cost (no blade to blade friction to consume power)—cuts on forward or backward travel.

Truly an efficient, safe, and economical lawn keeper, backed by a sound, time proved organization.

ASK FOR A DEMONSTRATION

WHIRLWIND LAWN MOWER CORP.
730 W. VIRGINIA ST.
MILWAUKEE WISCONSIN

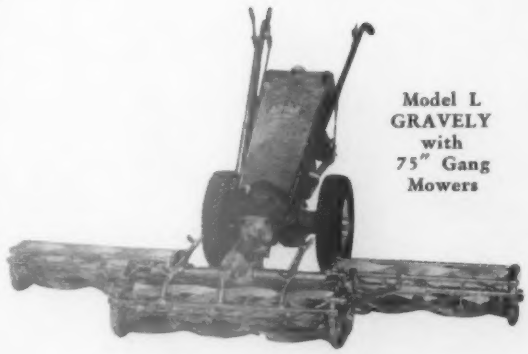
GRAVELY MANUFACTURING COMPANY

Box 252, Dunbar, W. Va.

Model L GRAVELY with Vee-Type Snow Plow

Schools and universities throughout the country recognize the distinct advantages of the GRAVELY—the **only** machine that solves so many upkeep problems.

1. **Mows Your Lawn**
2. **Cuts Tall Weeds and Grass**
3. **Removes Snow**



Model L GRAVELY with 75" Gang Mowers

A YEAR-ROUND MACHINE

You buy ONE sturdy 5 H. P. Tractor . . then, change **power** attachments according to the job. With the GRAVELY **one** man does everything. . . .
A 30-inch Power Driven Rotary Mower for the lawns (power-driven gang units and riding sulky available for the larger areas) . . . a Power Sickle Mower for the rough spots and athletic fields. . . .
A power sprayer . . . A Power Pump . . . A cart for moving dirt . . . or odd jobs of hauling. . . . Both Vee and a Patented Reversible Blade Type Snow Plow capable of working in 12" of snow. Whatever the job, if you own a GRAVELY you have the equipment and sufficient power to do it.

FRUITS OF SPECIALIZATION

The GRAVELY is produced in a factory devoted to manufacturing nothing else. This includes making the motor as well. Each manufacturing operation is controlled. This means that each machine is produced as a complete unit, each part **designed** to be used with the others . . . **not an assembling proposition.**

The GRAVELY products are sold **and serviced** through Dealers, for all GRAVELY Dealers are qualified to render service on the machines they sell. Write us that you may check with our representative in your neighborhood. Like the product, you will find our sales policy practical . . . you are not asked to buy a machine without first being shown what it will do,—under your very own conditions.

EXCLUSIVE GRAVELY FEATURES

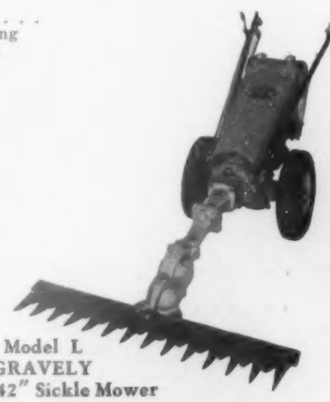
There is a 5 H. P. motor . . . **two** forward and reverse speeds . . . an automotive type differential . . . a worm gear drive running in oil . . . one spot lubrication system for both tractor and motor . . . NO CHAINS . . . an oil bath air cleaner . . . an oil filter to clean and strain the oil . . . a SAFETY SLIP CLUTCH individually incorporated into each power attachment . . . and many, many others.

Learn more about a machine that for TWENTY years has been improving the appearance of schools and universities and at the same time reducing upkeep costs.

Model L GRAVELY with 30" Rotary Mower

Ask for our catalog entitled:

"MAKING AND KEEPING A BEAUTIFUL LAWN"



Model L GRAVELY with 42" Sickle Mower

PITTSBURGH PLATE GLASS COMPANY

COLUMBIA CHEMICAL DIVISION

30 Rockefeller Plaza
New York, N. Y.

Chicago . Boston . St. Louis . Pittsburgh . Cincinnati . Cleveland . Minneapolis . Philadelphia . Charlotte

COLUMBIA CALCIUM CHLORIDE

COLUMBIA CALCIUM CHLORIDE

Year-round Protection from the Hazards of Dust and Ice

Few materials as economical and easy to use as Columbia Calcium Chloride pay such important dividends in health, safety and comfort.

When applied to tennis courts, playgrounds, driveways and similar dust-breeding areas, Columbia Calcium Chloride effectively checks the nuisance and dangers of dust.

Because of the effectiveness of Columbia Calcium Chloride in drawing moisture from the air, two applications are sufficient to assure a moist, compact, dust-free surface. One application should be made at the beginning of the dust season, and a lighter one about six or eight weeks later.

During the winter months, Columbia Calcium Chloride is an important safeguard against personal injury from icy walks and pavements. Even at zero temperatures, it melts ice from walks and stairways. Mixed with sand or cinders, it skidproofs drives and roadways much more effectively and quickly than untreated abrasives.

Columbia Calcium Chloride in the form of easily handled white flakes is available in 100 lb. moistureproof paper bags and in 400 lb. steel drums.

COLUMBIA CLEANER AND CLEANSER

A white powder especially prepared for hand cleaning operations, including glass, china, walls, refrigerators and other equipment. It is widely used by schools, clubs, dairies, hospitals, and restaurants.

COLUMBIA DETERGENT

This is a carefully prepared and blended cleaning mixture of the scouring type. It is especially suitable for large-area cleaning jobs such as enameled and painted surfaces, and tile or marble walls and floors.

• *Write today to our New York office for special folders on these Columbia products, and for prices and name of your nearest distributor.*

ANCHOR POST FENCE COMPANY

Complete Line of Fences and Playground Equipment

6695 Eastern Ave., Baltimore, Md.
SALES OFFICES IN PRINCIPAL CITIES

ANCHOR FENCES FOR SCHOOLS AND SCHOOL PLAYGROUNDS

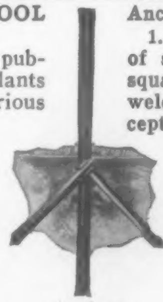
The Anchor Post Fence Company has been serving public schools and colleges, municipalities and industrial plants with fencing and playground equipment to suit their various requirements for nearly half a century.

Anchor Chain Link Fences

Makers of America's first chain link fence, the Anchor Post Fence Company today manufactures a complete line, and will be glad to supply any interested school executive or architect with a copy of our Chain Link Fence Catalog containing full information about the four exclusive features which make an Anchor Chain Link Fence exceptionally attractive and durable. **Ask for Catalog No. 110.**

Anchor-Weld Iron Fences and Gates

Through the exclusive Anchor-Weld method of construction, the Anchor Post Fence Company is able to manufacture iron fences and gates which equal in appearance many expensive hand-wrought products. Many schools throughout the country are today justly proud of their beautiful Anchor-Weld Ornamental Iron Fences and Gates. Some of these are to be found illustrated in our **Catalog No. 102.**



Anchor Drive-Anchorage

Anchor's Four Exclusive Features

1. ANCHOR-WELD WIRE GATE—built with a frame of square tubular steel—arc-welded at the corners. The square shape of the heavy steel tubing, together with the welding of the corners, provides a framework of such exceptional strength that no re-enforcing diagonal braces are needed. We claim that this is the strongest and most attractive wire gate made.

2. SQUARE TERMINAL POSTS—stronger because they are square in section. More protective—having no fabric-holding bands and therefore providing no footholds for climbing. Better-looking—because of their graceful lines.

3. U-BAR LINE POSTS—made of high carbon steel and U-shaped in section to insure maximum strength.

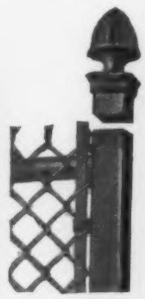
4. DRIVE-ANCHORAGE—grips the soil like the roots of a tree. We have imitated nature's engineering by providing the line posts with a broad foundation. Anchor drive-anchors defy thaws, frosts and the many other strains to which a fence is subjected.

Note: While we strongly advocate the drive-anchor method of setting posts, we can, if desired, set our posts in concrete footings when conditions warrant such a procedure.

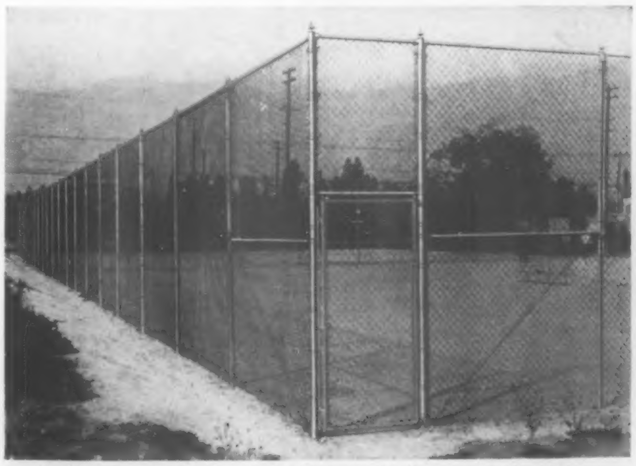
Anchor-Weld Wire Gate

Anchor Chain Link Fence with Top Rail
High School, Mineola, N. Y.

Anchor U-Bar Line Post



Anchor Square Terminal Post



Anchor Chain Link Tennis Court Enclosure at Pasadena High School, Pasadena, Calif.

Anchor-Weld Fence Surrounding St. Anne's School, Fall River, Mass.

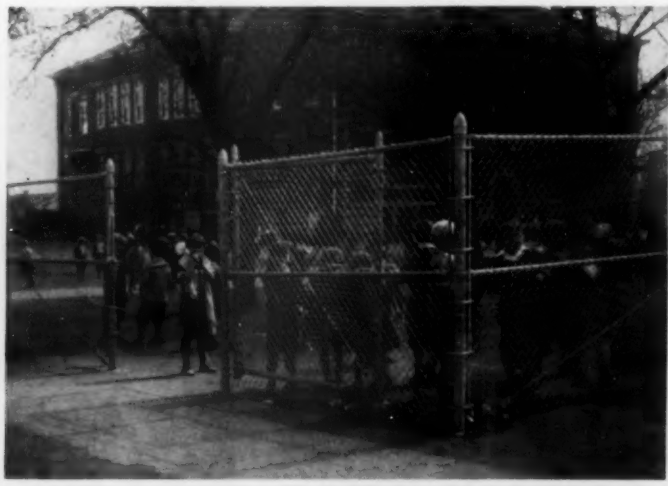
CONTINENTAL STEEL CORPORATION

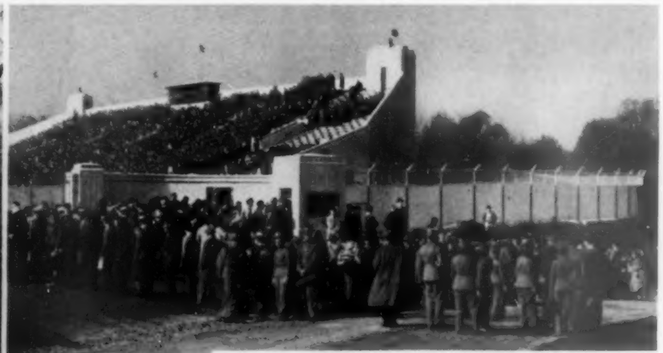
Manufacturers of Chain Link Fence for All Purposes

General Office: Kokomo, Indiana

SALES OFFICES IN FOLLOWING CITIES:

Alexandria, La.; Austin, Tex.; Atlanta, Ga.; Boston, Mass.; Canton, Ohio; Charlotte, S. C.; Chattanooga, Tenn.; Chicago, Ill.; Columbus, Ohio; Dallas, Tex.; Dayton, Ohio; Des Moines, Iowa; Detroit, Mich.; El Paso, Tex.; Evansville, Ind.; Fort Wayne, Ind.; Grand Rapids, Mich.; Indianapolis, Ind.; Kansas City, Mo.; Louisville, Ky.; Minneapolis, Minn.; Moline, Ill.; Nashville, Tenn.; New Orleans, La.; New York, N. Y.; Norfolk, Va.; Oklahoma City, Okla.; Omaha, Neb.; Philadelphia, Pa.; Richmond, Va.; San Antonio, Tex.; South Bend, Ind.; St. Louis, Mo.; St. Paul, Minn.; Toledo, Ohio; Tulsa, Okla.; Wichita, Kan.





14 CONSTRUCTION FEATURES

★ Fabric of *KONIK steel containing copper, nickel and chromium. *(U. S. Patent No. 1874814)

★ Heavy coating of zinc applied by a special process.

★ Full gauge wire woven in exact mesh.

★ Heavier "H" Section Line Posts.

★ Self Locking Barb Arms.

★ Heavier Post Caps and Arms.

★ More Post and Top Rail Ties.

★ Inside - Outside Top Rail Coupling.

★ New Type Lock Pin Eliminating Bolts and Nuts for Tension Bands.

★ Stronger and more easily operated Gates and Locking Devices.

★ Improved Pivot Type Hinge.

★ Quality Materials, each part designed for its particular place.

★ Engineered and erected for each specific job.

★ Continental CERTIFIED QUALITY materials and workmanship throughout.

The wide selection in styles, heights, types of top construction, gates and accessories makes it possible for Continental to provide the most modern fence protection for any school. This modern fence has heavier, sturdier posts, improved brace construction, more rust-proof fabric ties, and strong easily opened gates equipped with effective locking devices.

Made of Konik Steel

The fabric used in Continental Chain Link Fence is made of KONIK STEEL — CONTAINING COPPER, NICKEL AND CHROMIUM FOR GREATER STRENGTH AND RUST RESISTANCE CLEAR THROUGH. KONIK has higher tensile strength, and carries a heavy zinc coating applied by hot dip with special process to insure uniformity and adhesion of coating.

Engineering and Erection Service

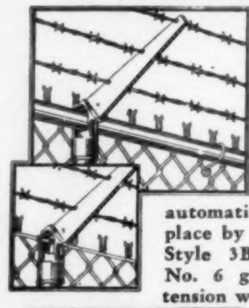
Our engineers are prepared to assist you in laying out the most economical installation for your purposes. Trained erection crews are available anywhere for correct and economical construction. When local labor is used Continental will supply competent foreman and inspection service.

Write For Free Manual

Get a copy of "MODERN PROPERTY PROTECTION," new revised manual on modern protection of property and control of traffic. Write or phone the Continental Steel Corporation, or the nearest sales office.

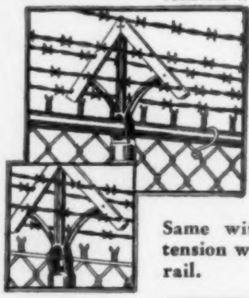
CONTINENTAL STEEL CORPORATION
KOKOMO, INDIANA
PLANTS at Kokomo, Indianapolis and Canton

A STYLE TO MEET EVERY SCHOOL NEED



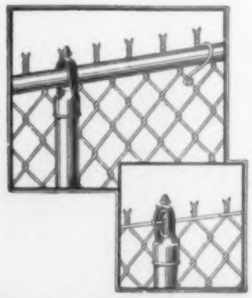
Style 3B - R—Three strands of barb wire with top rail. Arm of 12 gauge pressed steel. Barb wire held in angle slots and automatically locked in place by tension.

Style 3B-W—Same with No. 6 gauge coil spring tension wire instead of top rail.



Style 5B - R—Five strands of barb wire with top rail. Top rail of tubular steel 1⅝" O.D. Has 7" expansion sleeves.

Style 5B - W—Same with No. 6 gauge tension wire instead of top rail.



Style NB - R—No barb wire with top rail.

Style NB-W—Same with No. 6 gauge tension wire instead of top rail.

CONTINENTAL *Chain Link* FENCE

CYCLONE FENCE DIVISION

(American Steel & Wire Company)

UNITED STATES STEEL

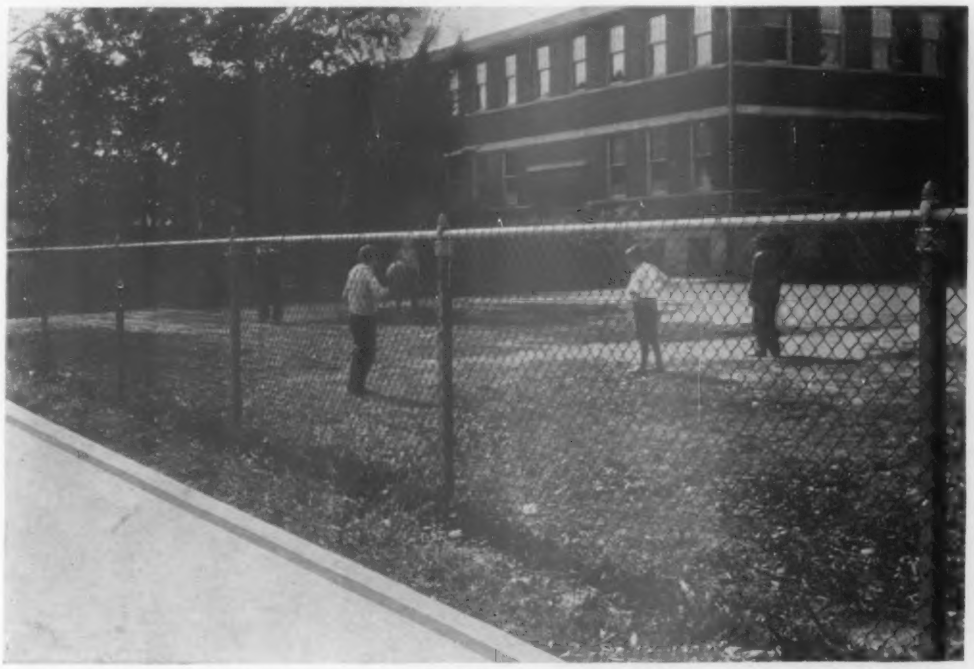
General Office: Waukegan, Illinois

Waukegan, Ill. Newark, N. J. Greensburg, Ind. DeKalb, Ill.
Cleveland, Ohio Fort Worth, Texas Tecumseh, Mich. Savannah, Ga.
Oakland, Calif. Portland, Ore.

United States Steel Export Company, New York

Cyclone Fence is the economical, serviceable enclosure for school yards, playgrounds, athletic fields, outdoor pools. For years Cyclone has specialized in fencing school property. Cyclone Fence is the recognized standard for every school and playground purpose.

Enclose your school grounds with genuine Cyclone Fence to provide maximum protection for your school children.



Cyclone Safeguard Chain Link Fence for School Grounds, Playgrounds, Parks, Institutions, Etc.

Fence your school Athletic Field with Cyclone and get more paid admissions to every game.

Because of its long, trouble-free service, you will find Cyclone Fence most economical in the end.

Learn how to test the value of any chain link fabric **before you buy.** Ask for a copy of the booklet "Fence—How to Choose It—How to Use It" and the Cyclone "12m" folder which shows how Cyclone's "12m" process of extra heavy galvanizing means longer fence life at small extra cost.

Cyclone Invincible Chain Link Fence for Athletic Fields

Cyclone Window Guards are sturdy—save money

ROBERTSON STEEL & IRON COMPANY

Robertson Chain Link Fence

Second and Elm Streets, Cincinnati, Ohio

CHAIN LINK FENCING FOR EVERY PURPOSE

Robertson Chain Link Fence and Chain Link Gates for Tennis Courts, Athletic Fields, Swimming Pools, Recreation Grounds and other School Requirements.

ROBERTSON FENCES OFFER PERMANENCE — PROTECTION — PLEASING APPEARANCE

Robertson Fencing is permanent, pleasing in appearance, and offers the maximum protection for students. Whether your fencing problem is providing an adequate backstop for the tennis courts, a means of marking the limits of your campus, or keeping unwanted intruders out of the athletic field, Robertson has the adequate fence to meet the most rigid requirements.

STURDY CONSTRUCTION — HOT DIP GALVANIZED

Fabric as well as the line posts, top rail, and other framework is made of copper-bearing steel of unusually high tensile strength, heavily galvanized by the hot dip process after fabrication. The gate corners are fitted with malleable iron castings or electrically welded. Robertson products are well known for resisting corrosion.

QUALITY — SERVICE — PRICE

have been the keynotes to Robertson success in chain link fence manufacture. Only the finest grades of steel and malleables are used. We specialize in service that is geared to fast action. Large stocks are always available for immediate shipment from centrally located factory. Our Engineers are ready at all times to help you solve your problems, without charge or obligation.

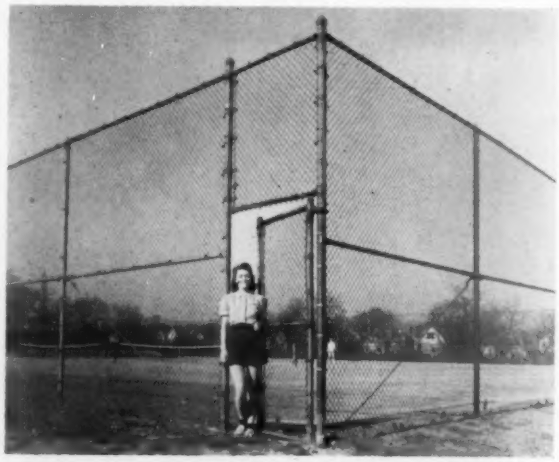
Robertson Price is always right. We maintain a price policy which is independent and flexible, and always competitive.

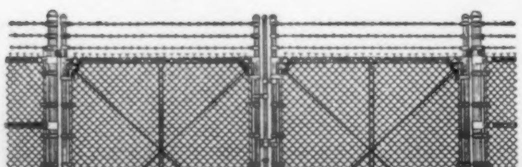
WRITE FOR FURTHER INFORMATION

Write for our catalog and learn what Robertson can do for you. Then let us submit estimates with or without erecting service. No obligation, of course.

ROBERTSON STYLE 400 and 500—is the ideal fencing for enclosing the school grounds. Standard heights of 3 to 12 feet. Sturdy, dependable, long lasting.

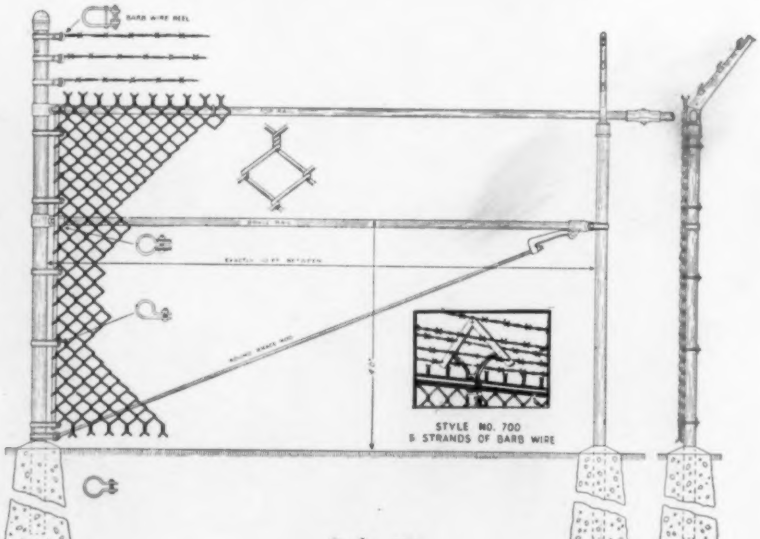
ROBERTSON STYLE 800 and 900 — will serve as an excellent tennis court backstop. Available in three heights, 8, 10, and 12 feet. Special heights to order. Will absorb a terrific amount of punishment.





ROBERTSON CHAIN LINK GATES (*Above*)—are heavily constructed. Furnished in all widths, single or double style, swing or slide type.

ROBERTSON STYLE 600 and 700 (*Right*)—are recommended for enclosing Athletic Fields. Cross-sectional view shows the rigid construction of the fence. Standard heights—3 to 12 feet.



Style 600

THE STEWART IRON WORKS COMPANY

"Fence Builders to America Since 1886" INCORPORATED

803 Stewart Block, Cincinnati, Ohio

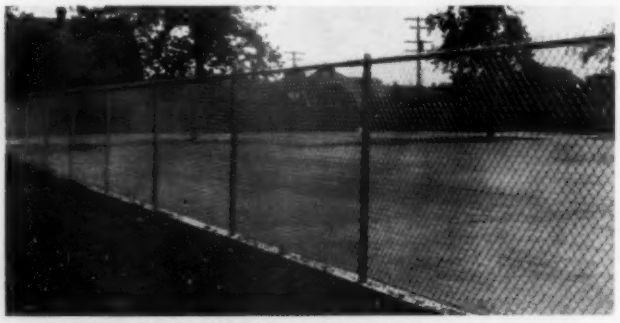
PRODUCTS
- Bronze Tablets
- Chain Link Wire Fence and Gates
- Flag Poles
- Folding Chairs
- Folding Gates

PRODUCTS
- Iron Fence and Gates
- Pipe Railing
- Settees
- Stadium Seat Brackets
- Window Guards
- Wire Mesh Partitions

FOR EVERY PURPOSE

Stewart offers Plain or Ornamental Iron and Chain Link Wire Fence and Gates for front, side and rear property lines; for athletic fields, tennis courts, recreation grounds and other school requirements.

Stewart Chain Link Wire Fence is the only ALL BEAM FRAMEWORK construction on the market.



Style 0TH Chainlink Wire Fence

Style 3TH

The Chain Link Wire Fence illustrations clearly show this exclusive feature. Notice the 3TH Oval-Back I-Beam Line Post with integral extension arm. Obviously this solid post is superior to pipe or other types of post requiring a separate pressed steel arm which may be removed or easily broken. Notice, too, that the beam top rail passes through the post itself—eliminating the need for fittings. The flat, smooth surfaces of Stewart All Beam construction offer maximum resistance to wear, weather and corrosion. This type of fence structure, exclusive with Stewart, is the heaviest and strongest manufactured.

Iron Fence Installation, Erie, Pa.

Usual heights of style 3-TH shown in illustration are 7 ft. and 8 ft. overall. All materials are of Copper-Bearing Steel hot-dipped galvanized **after** fabrication to assure greatest possible resistance to rust.

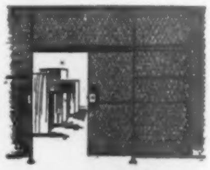
IRON FENCES AND GATES

For front property lines where dignity as well as protection is a requisite, Stewart offers a multiplicity of designs in plain or highly ornate iron. Here again Stewart construction is unique. The patented channel rail, exclusive with Stewart, adds immeasurably to the strength of the fence. All fittings are of Stewart design—the result of more than 54 years' experience and research in the fence building field.

METAL FOLDING CHAIRS

Built of strong steel channels. Full size seat with correctly pitched form-fitting back. Stewart Metal Folding Chairs are tip-proof. Standard finishes are: Black, Brown, Dark Green, Mahogany or Taupe. Literature and prices furnished upon request.

WIRE PARTITIONS



Effective and economical enclosures for locker rooms, stock rooms, supply rooms, tool rooms, machinery, power houses, etc. When writing for prices please send sketch giving measurements.

BACKSTOPS

Ideal for hard or soft baseball diamonds, tennis and badminton courts, etc. Sturdily constructed to stand the toughest abuse. Literature and prices furnished on request.

BRONZE PLAQUES

Plaques and tablets of hand-chased cast bronze, are available in stock sizes from 9" x 16" to 24" x 36". Special sizes will be made to order. Literature and prices gladly sent on request.

CATALOGS — SALES AND ERECTION SERVICE

Literature is available on all Stewart products. If interested in Chain Link Wire Fence ask for Catalog No. 79. If in Iron, ask for Catalog No. 76. When requesting catalogs, please indicate products in which you are primarily interested.

Stewart maintains sales and erection offices in all principal cities. Consult your local classified telephone directory or write direct to factory.

WICKWIRE SPENCER STEEL COMPANY

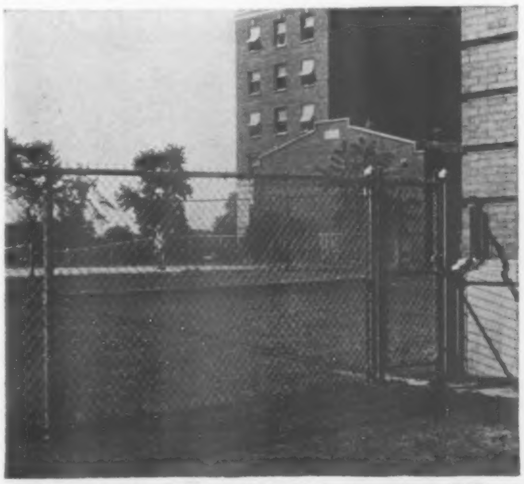
General Sales Office (Fence Dept.), 70 Niagara St., Buffalo, N. Y.

DISTRICT SALES OFFICES

New York City Chicago Worcester San Francisco Los Angeles Portland Seattle

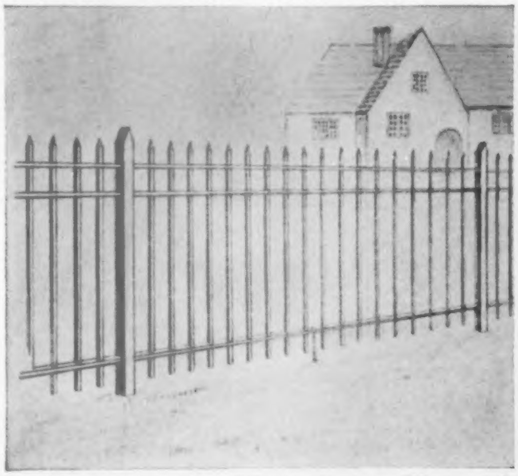
DISTRIBUTORS AND ERECTORS IN ALL PRINCIPAL CITIES

THE Wickwire Spencer Steel Company offers Chain Link Fences for all types of property, including schools, playgrounds, athletic fields, tennis courts, etc. Manufactured entirely in their own plants with complete control from mine to consumer. Sold with complete installation, or if preferred, we will furnish all necessary materials to be installed by others or with the services of a supervising foreman. All posts are furnished to set in concrete footings. (Concrete preserves the metals from corrosion below the surface.) All materials except non-ferrous metals are hot galvanized after fabrication.



Wickwire Spencer Type 420H Fence, using "H" section line, end, corner and gate posts. A design virtually foolproof as no bolts or nuts are exposed for possible tampering. Gates of similar construction using heavy square tubing with specially reinforced heavy hinges and locking devices. If desired, this type of fence is available with copper bearing pipe posts throughout.

Wickwire Spencer Tennis Court Design. Illustration shows a typical Tennis Court Fence design. Two types are available—310 (light construction) and 420 (heavy construction). Standard heights, 8', 10' and 12'.



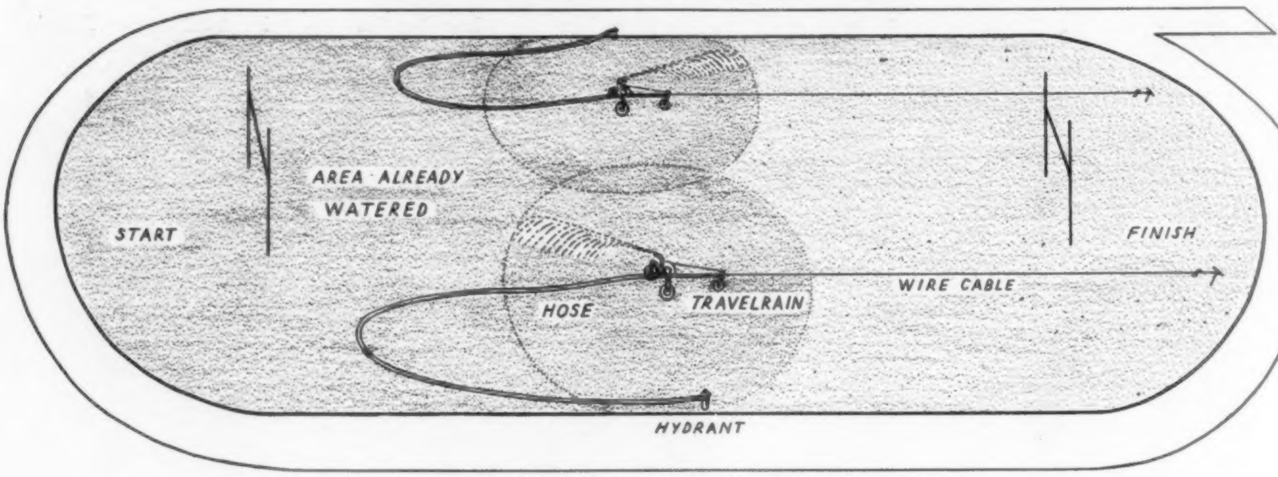
Wickwire Spencer Iron Picket Fence. We can furnish stock or special designs to conform with your wishes.

Wickwire Spencer Type 423 Fence with three strands of barbed wire. Illustration shows pipe posts throughout. Gates to match. This type is also available with "H" posts same as shown in Type 420H illustration, with gates of similar construction.

Write to this office direct, or to any of our district offices shown above, for catalogs, and full particulars. Distributors may be located near you. Ask us who they are. Estimates and engineering services will be furnished without any obligation on your part.

TRAVELRAIN POWER SPRINKLER CO.

Factory and General Offices: Beverly Hills, Calif.



FIELD LAYOUT AND PIPE PLAN

Two Travelrains cover average field in one setting. Free plan service on new installations. Please submit your problems to our drafting department

A TYPICAL SCHOOL INSTALLATION

FEATURES

- **Better Turf** — Thru equal distribution of water.
- **Lower Costs** — Each unit a self-contained automatic system.
- **Safe** — No sprinkler heads in the lawn.
- **Nite Watering** — Full daytime use of athletic field.

Model B Heavy Duty, $170.00

F.o.b. Beverly Hills—Shipping Wt. Approx. 170 lbs.

SPECIFICATIONS

- Waters area 100 x 600 ft. in one setting.
- Gearing runs in oil tight gear box.
- Power developed by water turbine.
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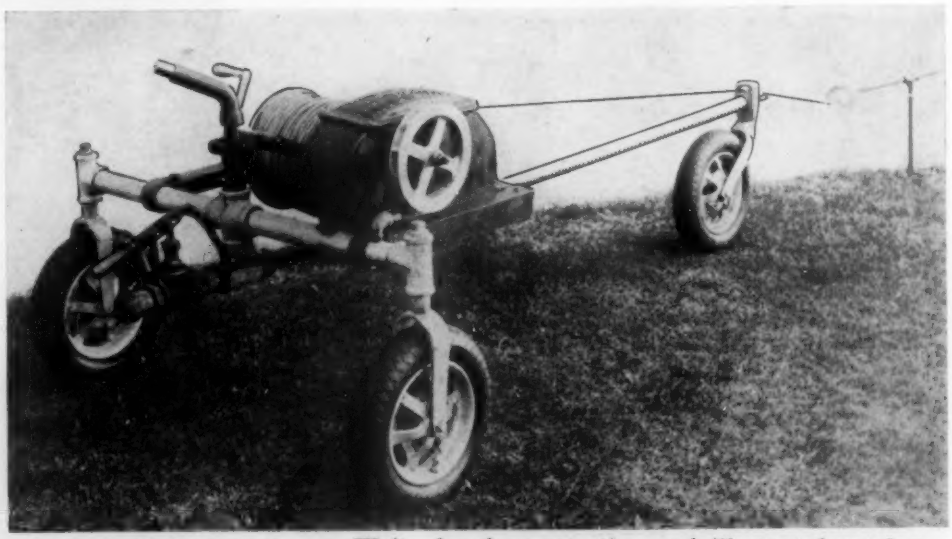

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SECTION VI
PHYSICAL EDUCATION AND ATHLETICS

NEEDED VARIATIONS IN RECREATIONAL PROGRAMS

By N. L. ENGELHARDT, JR.

Assistant Director, Department of Reference and Research, Board of Education, Newark, N. J.

GROWING out of the recent study * of design of community schools, the possibility was suggested that many desirable variations in elementary and secondary school programs could be identified by variations in environmental conditions and personal qualities of residents. If such a possibility proved to be a fact, the implications for public education would be exceedingly important. If public education were to be based on the factor of variability instead of standardization, our concepts of equal educational opportunity, of the methods of Federal and state financing of education, of school-plant design, and of curriculum, all would have to be revised.

The problems with which individuals are concerned necessarily vary widely. The inequalities of progress among the several socio-economic strata create inequalities in the load which social and educational agencies must bear. The adjustment of individuals to the demands of this dynamic society can be studied only in relation to the difficulties encountered in specific situations.

Little imagination is required to appreciate the fact that there can be no set formula by which either social welfare groups or educational agencies may operate to assure the adjustment of all individuals. Many educators recognize a need for differentiation in school programs to accommodate individual differences in capacities and interests. The acceptance of the concept of differentiation in curriculum undoubtedly is increasing. However, in the main, this concept is based on various measures of intelligence, interests, and abilities. Two well-known classifications of individuals are the "gifted" and the "handicapped." These groupings are defined on a basis of performance of children. It is said that the gifted child needs a richer experience than the schools now offer. The child who is handicapped, through either physical or mental conditions, needs experiences in the school which are adapted to his specific deficiency. Such kinds of variations are essential indeed.

Differentiation, however, should not end with mere measures of individual performance. If the school is to become an important part of the lives of children and youths, it is essential that its program be differentiated not only in terms of the variation in performance of individuals as measured by school tests. Differentiation must also consider the character and intensity of pressures and influences exerted on the individual by human relationships and environment outside the school.

In the light of this hypothesis, research has been directed in recent months to the study of variation in education. A tentative definition of variation was developed as a starting point. Variation connotes "deviation in the structure or function of education in response to conditions of environment and personal qualities of people."

Initial intensive study of variation has been made in the city of Pittsburgh.* Within this city there are many variations in the contributions which environment and people make to education, welfare, and society. People in slum areas have no provision in their homes for social recreation. They have few radios, no place in which to entertain friends in the evening, and no facilities for play. They have limited money with which to attend commercial amusements, and little money for travel. Their cultural outlook is different from the better-trained, more highly educated people living under better environmental conditions. They need vocational training to become efficient economic producers. They need social recreation and physical recreation spaces which are available to them

* Engelhardt, N. L., and Engelhardt, N. L., Jr.: "Planning the Community School." The American Book Co., New York, 1940.

* Strayer, G. D., Engelhardt, N. L., et al.: "The Report of a Survey of the Public Schools of Pittsburgh, Pa." Bureau of Publications, Teachers College, Columbia University.

at all times to give them an opportunity in these areas for the development of self-realization, which is provided for in the homes in the more favored areas. School plants thought of as community centers in the poor environments should include many spaces which have been designed with the thought of providing a desirable place for children, youths, and adults to meet with their friends in social intercourse during the day and in the evening. These people need social rooms with comfortable equipment for informal group meetings. They need informal library facilities, lounge spaces in which to gather to listen to radio programs or to discuss their problems, and they need game spaces which will offer them a variety of activities and which will afford pleasurable recreation. Therefore, in planning school buildings consideration should be given to the development of facilities and spaces which meet the needs of the people in terms of their environment and their personal qualities.

An Index of Variation

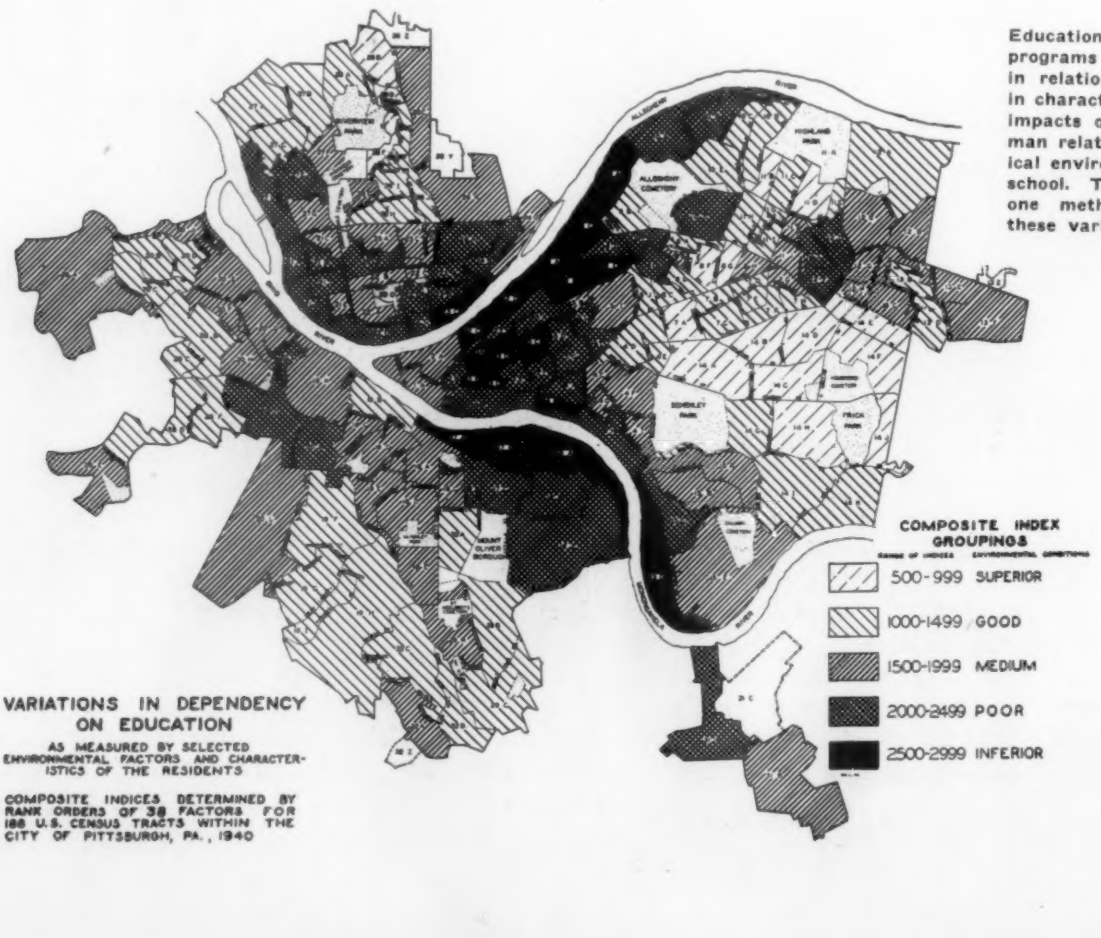
In order to make possible further discussion of this need for variation, indices were developed of environmental and social conditions for each of 188 census tract areas in the city of Pittsburgh. In making the indices, 38 factors were considered. The indices were computed by the summation of the weighted ranks of each factor. These factors, grouped under population, health, housing, and social conditions, are as tabulated below:

1. *Population Distribution* (40)
   (Percentages following age groups are of total population.)

   a. Under 1 year of age (3)
   b. 1 to 4 years of age (4)
   c. 5 to 9 " " " (6)
   d. 10 to 14 " " " (6)
   e. 15 to 17 " " " (5)
   f. 18 to 19 " " " (4)
   g. 20 to 24 " " " (4)
   h. 25 to 29 " " " (3)
   i. 30 to 34 " " " (2)
   j. 35 to 44 " " " (1)
   k. 45 to 54 " " " (1)
   l. 55 to 64 " " " (1)

2. *Health Conditions* (20)
   a. Diphtheria (5)
   b. Syphilis (5)
   c. Tuberculosis (2)
   d. Cancer (1)
   e. Infant deaths (7)

3. *Housing Conditions* (60)
   a. Median equivalent rentals (10)
   b. Population density (9)
   c. Per cent of homes with radios (8) (reversed)
   d. " " " " overcrowded (6)
   e. " " " " owned (4) (reversed)
   f. " " " " without bath (7)
   g. " " " " in bad order (8)
   h. " " " " without water-closets (3)
   i. " " " " without running water (5)



Map 1

Educational and recreational programs should be developed in relation to the variation in character and intensity of impacts on children by human relationships and physical environment outside the school. This map illustrates one method of expressing these variations geographically

4. *Social Conditions* (64)
   a. Birth rate (6)
   b. Illiteracy (8)
   c. Unemployment (5)
   d. Per cent of aliens to foreign-born (5)
   e. Homicides and other violence (6)
   f. Per cent of women working to men working (3)
   g. Relief (5)
   h. Professional men workers (4) (reversed)
   i. Automobile sales (2) (reversed)
   j. Per cent of youths 15 to 17 years of age employed (4)
   k. Per cent of youths 15 to 17 years of age not in school and not employed (8)
   l. Per cent of youths delinquent (8)

Weighting of Factors

These factors are not equal in importance. They were therefore weighted on the basis of survey staff opinion. The weighting is indicated by the numeral in parenthesis following each factor. However, because of the high correlations among many of the factors used in making the index, these weightings did not exert a very great influence in the determination of the final indices. It has been proved that the addition or subtraction of a few of the factors which were used in the development of such indices does not greatly influence the final result. Although there may be questions as to the justification for including certain factors in the index, several factors may be left out without influencing the relative position of each district.

The result of this synthesis is shown on Map 1. The black areas of the map indicate those districts which have the lowest relative standing in the city in terms of the combination of all the foregoing factors. The light areas indicate those neighborhoods which have the most desirable environmental situation and social qualities.

The Nature of Variation

In order that a clearer understanding may be had of the meaning of the measure of variation, a comparison is presented of two districts which fall at opposite extremes of the variation scale. The index of variation for district A is the lowest numerically of all districts in the city, indicating that it is one of the most desirable neighborhoods. The index of variation for district B is one of the highest numerically, indicating poor environment and undesirable social conditions.

These two districts have approximately equal total populations, having been 4,207 and 4,535 respectively in 1930, but the number of children of school age in district B is nearly double that found in district A. Accordingly, one would expect to find twice as many high-school graduates in B as in A. However, in 1939 the number of graduates in B was half that found in A. This fact presents a very serious problem in equalization of educational opportunities at secondary-school levels.

There is much congestion and overcrowding of homes in district B. The population density in this area is over three times as great as in A. In such congested districts children are required to play in the streets and alleys. The overcrowded home offers little opportunity for social growth or recreation. The question arises: Is it not essential for wholesome growth of children to provide facilities in the schools to assure desirable social development and healthy recreation?

Variations in Health

Poor health conditions in an area is a problem not only of the health authorities but also of the schools. For example, the diphtheria morbidity rate in 1934 was approximately four times as great in district B as it was in A. Information concerning inoculation should be disseminated by the schools and be made effective. The infant death rate for district B was 75.2, compared with 35.0 for district A.

Variations in Economic Levels

The economic level of district B is of course far below that of A. The median equivalent monthly rental was $10.67 in the former district and $73.67 in the latter. New passenger automobile sales during the period 1934 to 1937 were 101 in number in B and 1,106 in A. In district B 59.6 per cent of the homes average more than one person per room, while in A only 2.2 per cent of the homes are so crowded. In 1931, 34 per cent of workers were unemployed in B and only 10 per cent in A. Twenty-three per cent of homes in B reported owning a radio, and 79 per cent so reported in A.

Comparisons were then made between these indices of variation and such factors as economic status, attendance at adult evening schools, school-building conditions, playground provisions, and school programs. A few of the findings are presented here.

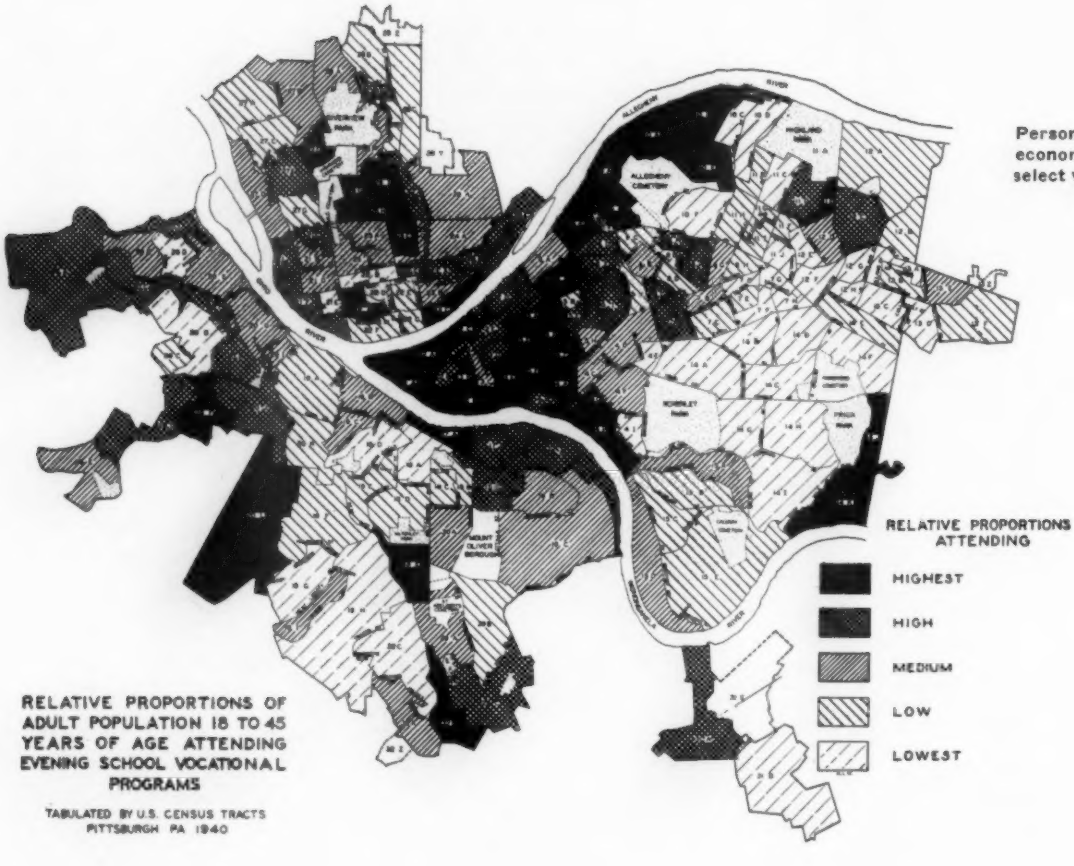
A study was made of the enrolment of adult evening schools according to the types of programs selected by residents in the various areas in the city. These programs were grouped by vocational, recreational, and cultural classes. Maps 2, 3, and 4 show graphically the relative proportions of adults attending the various programs. A comparison of these enrolments with the indices of variation indicated the following neighborhood characteristics:

1. Neighborhoods having extremely favorable environmental and social conditions were not represented in adult classes.

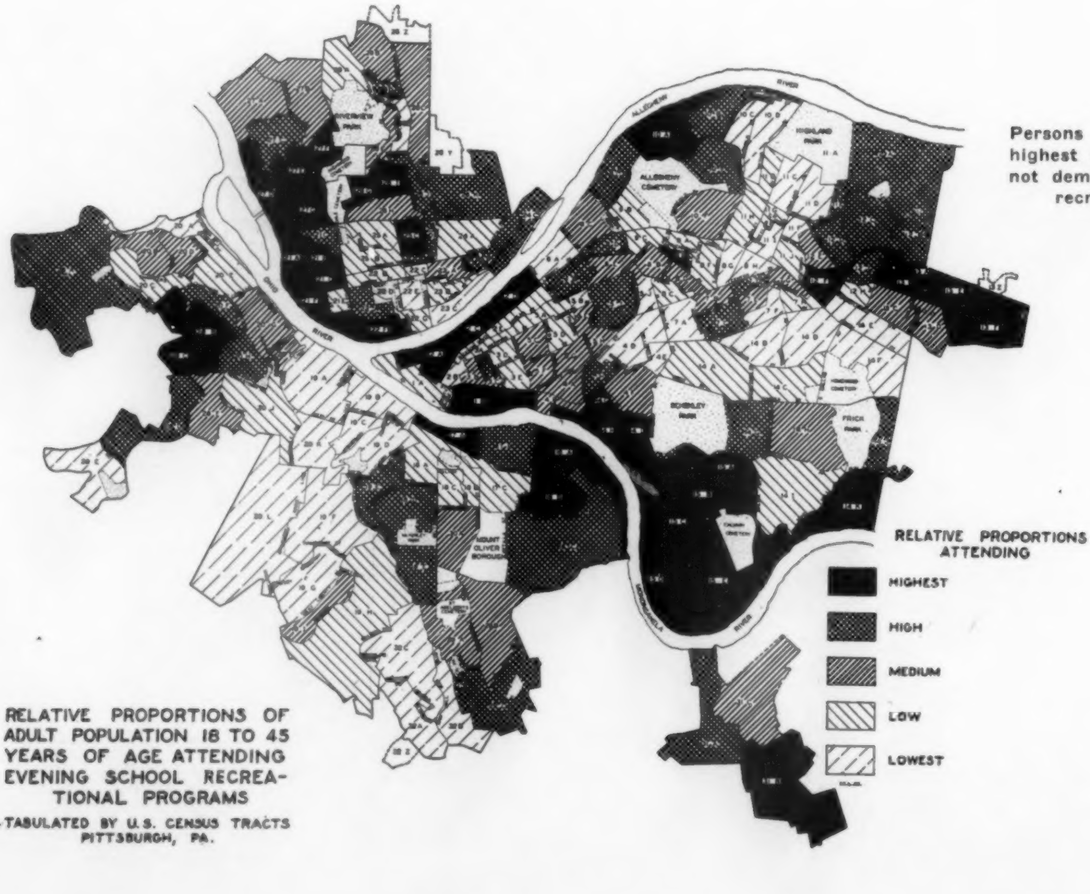
2. In neighborhoods with very great handicaps in environment and social conditions, a large portion of the adult population attended both vocational and recreational programs.

3. The neighborhoods which fell in the medium

Map 2
Persons living in areas of low economic status voluntarily select vocational courses over other offerings

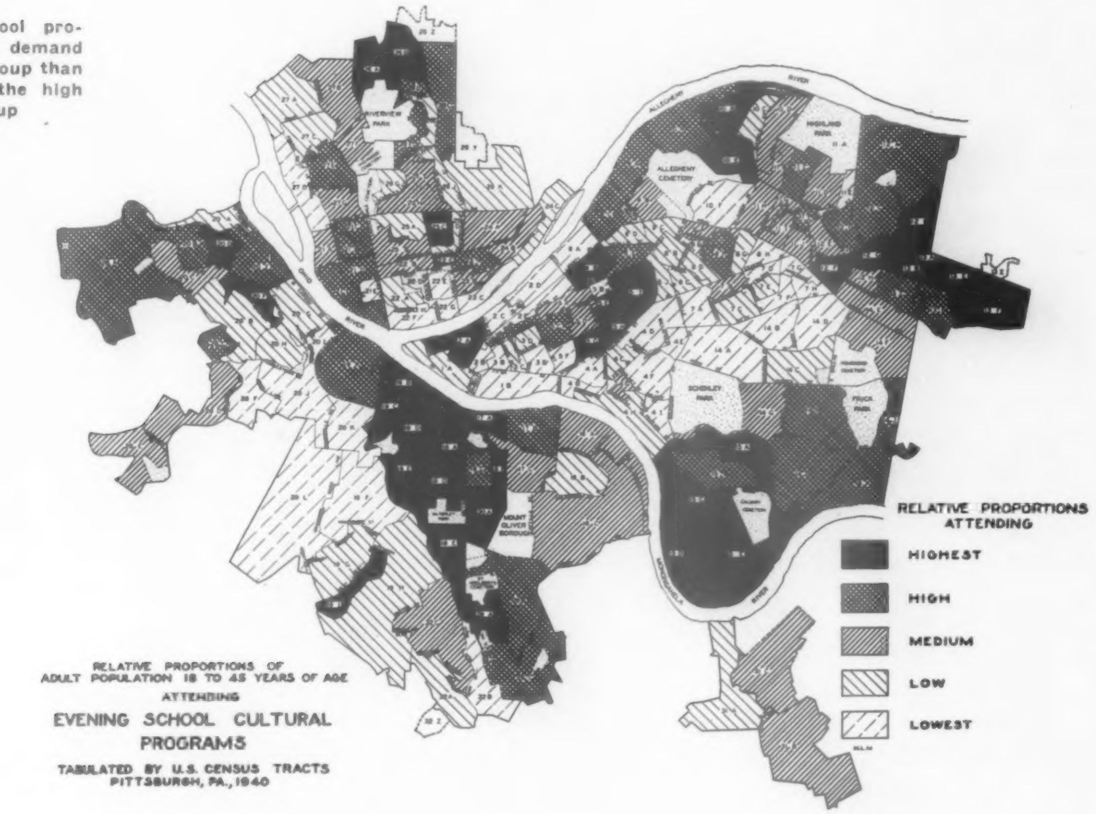


Map 3
Persons living in areas of highest economic status do not demand extensive adult recreation facilities



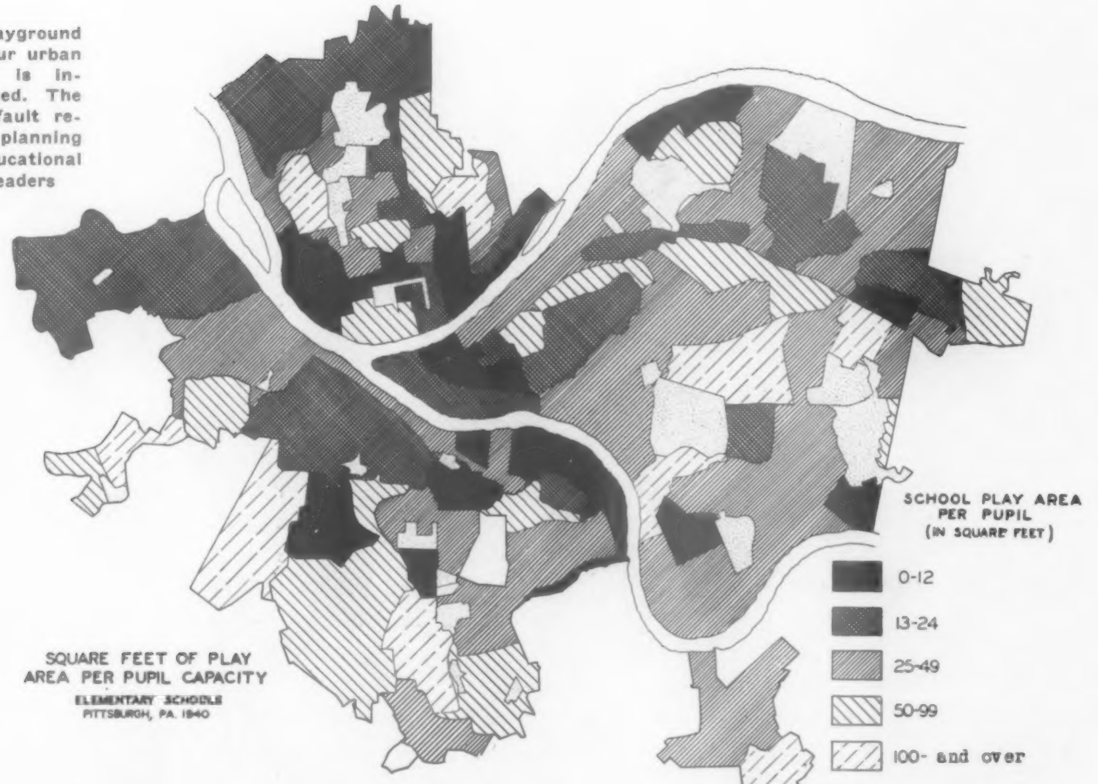
Map 4

Cultural adult school programs are more in demand among the middle group than either the low or the high economic group



Map 5

The amount of playground space in many of our urban centers frequently is inversely related to need. The correction of this fault requires intensive planning and effort by educational and recreational leaders



group of variation indices showed the greatest demand for cultural courses. This group also developed heavy attendance in recreational programs.

Since attendance is based on programs selected voluntarily, it is possible to make certain assumptions as to the type of compulsory educational program which might be most acceptable in terms of variation in environment and personal qualities of the residents. The stress on the vocational program in the most dependent areas is, as would be expected, indicative of the desire of these people to improve their economic status by becoming efficient producers. People in these areas have little or no economic ability which would permit them to attend colleges or private trade schools. The result is that a large majority of them are unskilled or semi-skilled workers with low income-producing ability. Youths may be required to leave high school at an early age in order to produce what income may be possible to assist their families. The need for types of high schools which will provide the training necessary to assure these people a reasonable standard of living is quite apparent in these areas. In turn, it may be possible through proper programs to assist some of these people in moving out of the less desirable environments and in making these environments more satisfactory places in which to live.

Other studies of variation in the city indicate that the movement of population out of areas which have the less desirable environments is a slow process. These areas present problems in regard to school buildings and educational facilities, since for the most part they are old sections of the city and possess obsolete school buildings. The residents of areas having the poorest environments are most dependent on education. It is important to recognize the need for a comprehensive school-building program in these areas in order to assist the people in improving their status and to help them become more valuable participants in our economy and society. Large amounts of money are being spent in the poorest areas of the city for relief, for elimination of delinquency, and for medical care—all the results of inadequate placement of people in our society.

School-plant facilities cannot be neglected in such areas with the thought that decreasing population will eventually eliminate the necessity of rebuilding. It is clear from this study that decreases in population in these areas occur so slowly that many generations live in an environment totally unsuited to their needs. The school must take the lead in providing facilities and programs which will enable these people to improve their status.

Map 5 indicates the number of square feet of school play area available for elementary school children. A comparison of this map with the map of variation shows that children in the least desirable environments lack adequate play space.

Congested areas require large playgrounds, many facilities for indoor physical and social recreation, and informal neighborhood libraries to give the people an opportunity to do things which the homes and the parks and the schools offer residents in the better neighborhoods. Similarly, the most desirable neighborhoods may require facilities which are not so important in the more dependent neighborhoods. For example, auditoriums for dramatic work, forums, and spaces for the development of discussion and activity growing out of college training, are desirable in areas which have the highest personal qualities. Such spaces are less important in the most dependent neighborhoods where social rooms, game spaces of all kinds, and counseling rooms, appear to be most important. Schools in the most dependent neighborhoods should be provided with sites large enough to accommodate lawns, trees, large playgrounds, wooded areas, and the like, which are being offered to children living in the more favored areas of the city. Equalization of educational opportunity requires that consideration be given to variation in physical plant facilities to the degree that it is expected in the school program.

Age Groups

The most desirable areas as measured by the index of variation show a slight tendency to have a lower proportion of their total population in the group 5 to 17 years of age. In other words, children of school age make up a higher percentage of total population in the less desirable neighborhoods than they do in the more desirable neighborhoods. It should be stressed, however, that the differences are slight. A study of four age groups, (1) those under 10 years, (2) 10 to 20 years of age, (3) 21 to 44 years of age, and (4) 45 years of age and over, indicates that the most dependent areas in many cases have the highest percentage of children 10 to 20 years of age, that they also have the lowest percentage of adults 21 to 44 years of age, and that they have the highest percentage of people 45 years of age and over. This seems to indicate that in many cases the young adults 21 to 44 years of age are living in the more desirable areas and indicates a tendency for the population under 10 years of age to grow up in better environments. In accepting this latter statement, however, it is important to recognize that although many children under 10 years of age are living in the more desirable sections of the city, there is still a very large number in this age group living in the least desirable sections. There is every reason to believe, however, that, given the opportunity, especially from a financial point of view, young married couples will migrate to better areas to raise their families.

Economic Status in Relation to the Index of Variation

To a very large extent people live in poor environments because of lack of ability to pay the rents demanded in better environments. Likewise, it is believed that the majority of people in the poor environments do not have the skills or developed abilities to raise their incomes to a point which permits them to move out of these situations, however much they may wish to do so. Some indication of this fact can be had by correlation of median equivalent rentals and indices of variation. This correlation is presented in the accompanying chart.

The median equivalent rentals by census tracts have been plotted against the indices of variation for corresponding tracts. It is apparent that areas of very low rentals also are areas having highest dependency on education. As the environmental situation improves, the rentals increase, until a point is reached equivalent to about $48 a month rental. Beyond this point there is no general improvement in environment or personal qualities of residents, even though the median equivalent rent in one area was $185. In one case a median equivalent rental of $79 was found in an area which had the same environmental qualities as areas which had rentals as low as $37, and only slightly better than some areas which had rentals as low as $26. It is to be expected that the correlation would present a picture similar to that shown in the chart, but it must also be pointed out that economic status does not tell the entire story so far as variation in needs and dependency on education are concerned. In many of the areas which had the highest median equivalent rentals, there was no material improvement in environmental setting or personal qualities of residents over that found in the areas which had rentals below the average for the entire city. The implication for the schools is that the areas of the highest economic status require careful study and analysis in order to develop school plants and facilities of a type which may be needed in these areas as well as those which are lower on the economic scale.

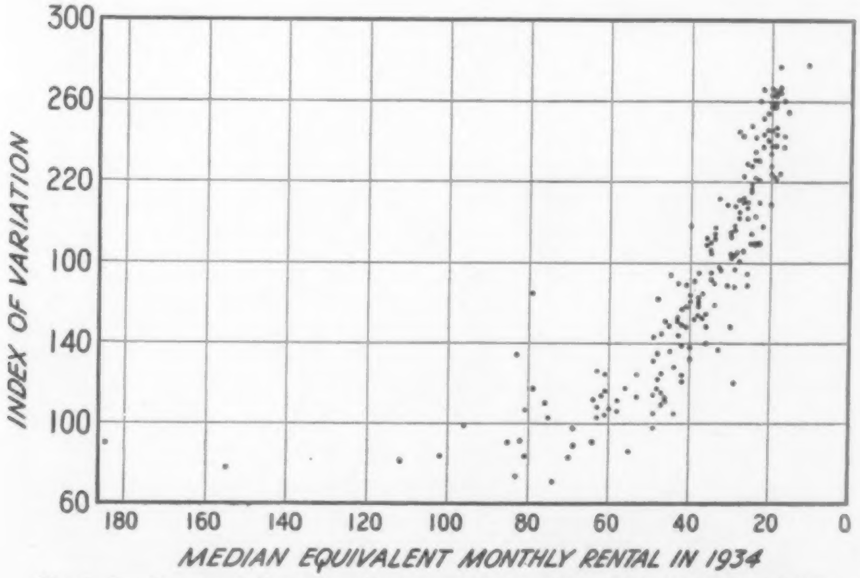


Chart showing correlation of median equivalent rentals and indices of variation

Summary

There are many measurable factors in home and community environment and personal qualities of people which exert much influence on the development of children and adults. Many of these factors create pressures on individuals which range from complete opposition to the school program to complete paralleling of curriculum. Many factors, although contributing greatly to education of one kind or another, go unrecognized by the school. It is important for the development of a wholesome and broad school program to establish some measuring device which will serve as an indicator of the direction which the curriculum should take in each neighborhood situation.

In the field of recreation there are many factors which should be considered in establishing a given program. In one community environment social recreation may be more important than physical recreation. Another community may lack playgrounds. One setting may lack opportunities for evening, week-end, or vacation recreation. In another case, the home may offer none of the spaces necessary for enjoying companionship, quiet games, reading, or radio programs. Standardized recreational programs or physical education curricula may fail to make allowances for such differences in home and community environments.

The measurement of variations in community environment and personal qualities of the residents is not difficult. These variations, when related to the educational problems of a city, represent measures of needed differences in the school program to supplement or offset the impact of environment. In reality, children who have no provisions for social or physical recreation in their homes are more dependent on the schools for these provisions than children who are provided elsewhere with adequate facilities during out-of-school hours. It may be well to plan in the light of recognition of the fact that there are variations in dependency on public schools among neighborhoods and communities as well as individuals.

THE NATATORIUM AT OHIO STATE UNIVERSITY

Critical Observations after Nine Years of Use

By **HOWARD DWIGHT SMITH**
University Architect

and

MICHAEL PEPPE
Swimming Coach

EVER since the two-day celebration in February, 1932, on the occasion of dedicating the Gymnasium and Natatorium at Ohio State University to its use in the expanding physical education program, the Natatorium has enjoyed widespread interest among physical education teachers and administrators and among participants in water sports. In addition to local interest and student use, a large number of intercollegiate and other amateur aquatic meets and pageants have brought participants, officials and spectators in large numbers to the Natatorium, and quite frequently college physical directors, building committees and architects have been interested in inspecting the plant. In general, the features of the Natatorium which were of prime interest at the time of its dedication have proved to be of continued interest through these nine years of use. The two features which seem to attract universal attention of visitors are: (1) the use of three pools in separate rooms, making possible at all times a widely varied program of scheduled classes for swimmers and non-swimmers, and of practice for competition; and (2) the arrangement and the decorative scheme of the exhibition amphitheater.

Our purpose in this article is twofold. We propose to recount the architectural and mechanical features which are found in the Ohio Natatorium, and to describe them briefly for the benefit of any who may be interested in such a catalog of ideas and details of a swimming establishment designed ten years ago. We propose also to tell frankly the things we think we would change, now that we have had nine years of rather intensive use of the plant. We do this for the benefit of those who may be interested in our suggestions for improvements, based upon our own experiences, and upon the friendly observations of swimmers, instructors, officials and spectators, many of whom would hesitate to record any critical comment on the Natatorium or any of its appointments.

The Design

The design of the Natatorium is based upon the idea that an all-around college aquatic program requires three separate pools—one for routine class work in physical education, one for instruction to non-swimmers, and one for competitive aquatics. There are two principal reasons for the separation of class and instruction pools. The programs are of course quite different in nature, and the depth of water for instruction must be much less than that for routine class or intramural work. There are three principal reasons for the separation of the exhibition or Varsity pool from the other two: the program is generally highly specialized; the pool should be available constantly for individual and team practice; and provision for spectators is required. Even if a pool could be designed to meet the requirements of the three diverse programs of instruction, class work, and exhibition, the problem of time schedule in an institution of large enrolment would place definite inconveniences and restrictions upon a well-rounded aquatic program.

Arrangement of the Three Pools

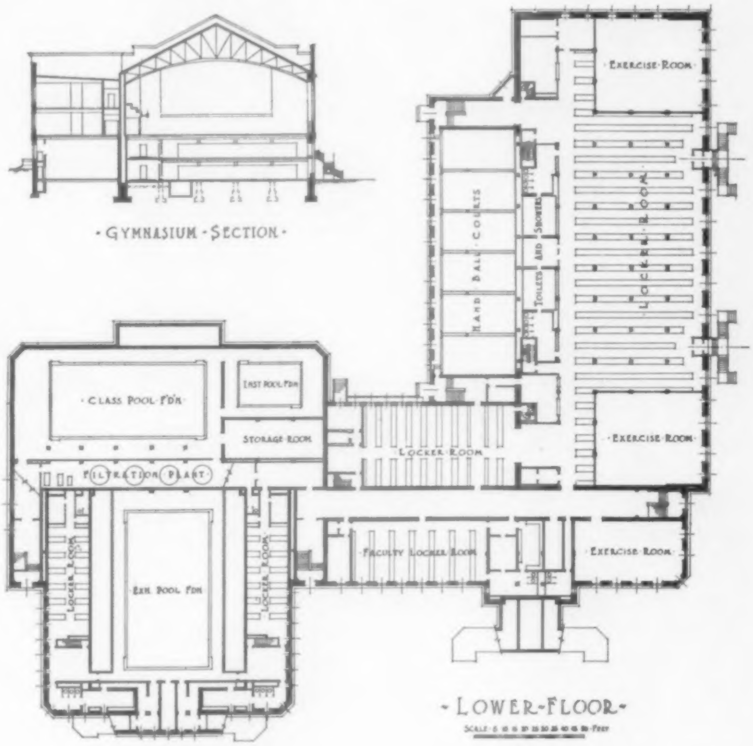
The Ohio plan is laid out to provide concentration of administration and control of the three pools. The accompanying main-floor diagram shows the arrangement of the three pools, with the director's office having direct access to the class pool room and to the exhibition pool room. Participants' access to the class pool and to the instruction pool from the student locker room is through (1) a control room where privilege cards are deposited, (2) toilet room, (3) shower room, (4) one-way turnstile, and (5) footbath. Exit is controlled by means of a one-way turnstile to the drying area in the adjoining control room. Participants' access to the exhibition pool room, as indicated by the accompanying lower-floor diagram, is from team locker rooms under the seat banks, through (1) toilet room, (2) shower, and (3) footbath, while exit is by turnstile directly into the drying room. Generally speaking, where swimming pools are a part of a gymnasium unit, locker rooms are used in common. In the Ohio plan, where the Gymnasium was built as one structure by funds from state appropriation, and the Natatorium was built as an adjoining structure from funds furnished by the Athletic Board, special locker space is provided under the seat banks of the amphitheater, for members of aquatic teams and for visiting competitors and officials.

The instruction pool room is 32 feet wide, 49 feet long, and 12 feet high. The pool itself is 20 feet wide, 30 feet long, and 3 to 4½ feet deep. The class pool is in a room 100 feet long, 47 feet wide and 12 feet high. Along one side is a narrow observation

gallery with 120 seats for student use, and on the opposite side a solarium alcove, the roof of which may be opened to the sky. The class pool is 35 feet wide, 75 feet long, 4 to 9 feet deep. There are three spring-boards at the deep end of the pool. The construction and finish of the instruction pool and the class pool are similar. They are lined with white vitreous tile, and the decks and areas around them are of light-tan vitreous tile. The walls of the rooms are faced with tan salt-glazed brick, and the ceilings are lined with painted cork slabs. Both rooms have outside light through large windows on two sides of the rooms.

The Varsity or exhibition pool is in a sort of amphitheater with seat banks rising in galleries on two sides and at one end, accommodating approximately 1,500 people. The room is 110 feet long, measured lengthwise of the pool, and 120 feet wide, measured crosswise. The center portion of the room is 40 feet high from the water level to the top of the arched ceiling. The room has natural light from three large and six small double-glazed windows at the north end, and from a skylight in the south portion of the arched ceiling over the "working" end of the pool. At this end there are three regulation diving-boards. The two near the sides of the pool are one meter above the water. The middle board is three meters high, and is reached by means of ladders which extend from the pool level up to the bronze-trimmed balcony which is a part of the decorative scheme of the room.

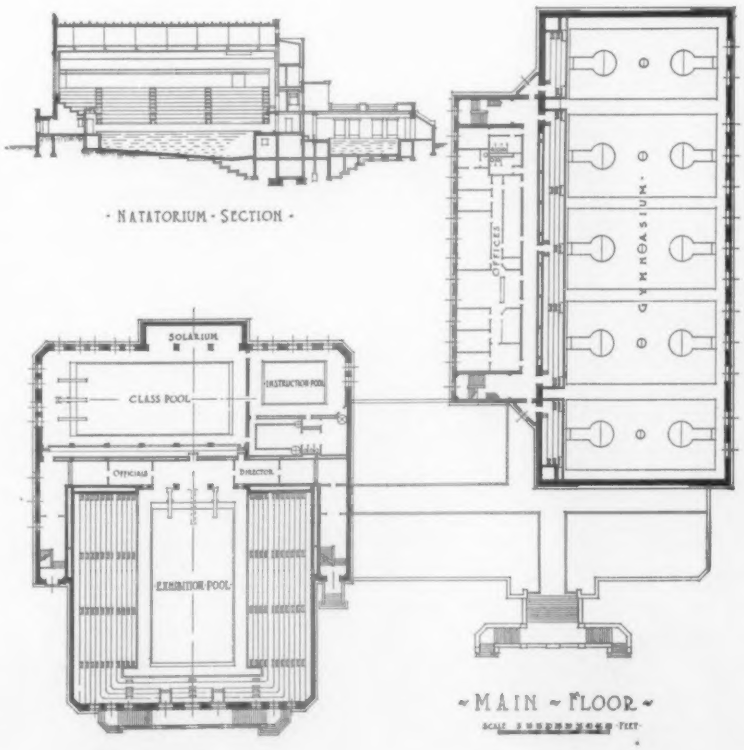
The pool itself is 75 feet long and 40 feet wide, 7 feet deep at one end and 12 feet deep under the diving-boards. It is lined with white ceramic tile. The luminous blue-green of the chlorinated water has been used as a basis for the color scheme of the entire room. The decks along the sides and ends of the pool are pale olive-green vitreous tile, extending down over the shallow pool gutters and 6 inches below the water level. The walls around the pool, and the wainscot on the gallery walls, are made up of eight shades of green tile, mixed at random, but generally grading from dark shades at the bottom to lighter shades at the top. The walls above the tile wainscot, and all the ceiling areas, are lined with 1½-inch thick cork slabs,



Howard Dwight Smith, University Architect

Natatorium and Gymnasium, Ohio State University

These floor diagrams show the relationship of the Natatorium to the rest of the physical education facilities. The Natatorium plan and section show the predominating position occupied by the Exhibition Pool and its Amphitheatre with seats for 1,500 spectators



painted in varying shades of green and tan on the walls and silver on the ceilings. This cork treatment of the walls and ceiling areas serves three purposes—acoustic correction, heat retention, and condensation reduction.

There is one structural feature in connection with each of the three pools which should be mentioned here. Provision has been made to allow expansion and contraction in and between the various parts of the structure by building the three pools entirely free from any direct connection with the walls or foundations of the rest of the building. The reinforced concrete walls of the pools are designed as vertical slabs sustaining the pressure of the water, and held at the top by the floor slab of the deck, bound into the top of the pool walls on the inside, while the outside edge of the slab rests on a shelf built into the walls of the building. Upon this shelf the deck slab is free to move. Thus there is a sliding joint on all four sides of each pool, which allows for any normal structural movement which may be experienced. At the sides of the pools these joints are concealed under the heat grilles, and elsewhere they are concealed under bronze threshold strips.

This system of construction permits a full walking-height tunnel around the exhibition pool, and ample pipe space around the class and instruction pools for the location of, and convenient access to, the piping accessories in connection with the heating, ventilating and plumbing equipment.

Lighting—Heating—Ventilation

Artificial lighting is provided in the room by a group of 47 150-watt floodlights in the curved ceiling, and 40 100-watt lights in the flat ceilings over the seat banks. Underwater lighting is provided by a series of six floodlights on each side of the pool, which are set in waterproof compartments just below the water line.

Heating and ventilating any physical education building is a rather highly specialized problem. Three things are involved which make the problem a special one: (1) much of the space is used by persons who have little or no clothing on, and some of the space is used at the same time by persons who are fully clothed; (2) odors from locker and exercise rooms must not be permitted to permeate other portions of the building; (3) condensation due to high humidity must be avoided or controlled. In the Ohio State Natatorium heat is provided by forced circulation of hot water from the central power plant of the University, so that the consideration of boiler room, coal storage, ash removal, etc., was not involved in the design of the building. The heating of all rooms in the Natatorium is by means of a down distribution piping system of direct radiation, except in the exhibition pool. The heating of the exhibition pool is by means of two unit heaters located under the gallery seats at the north end of the room. These heaters are so arranged that they can recirculate air from within the room or draw in outside air for cooling in warm weather.

The ventilation of the three swimming pool rooms, lockers, showers and toilets is accomplished by supplying fresh tempered air through supply fans and by removing vitiated air through exhaust fans. The use of both a supply and an exhaust system insures positive control of the flow of air, as to both quantity and direction. In addition to this system of supply and exhaust, an attempt has been made to provide special ventilation in the exhibition amphitheater to take care of spectators. Naturally, when the pool is being used only for coaching or for practice in competitive sports, the number of persons using the room is small and the amount of fresh air required for ventilation is not large. But with a crowd of 1,500 persons occupying the seats, the problem becomes a complicated one. The swimmers and divers are scantily clothed and are located at the lower level, where normally the atmosphere is coolest. The spectators are generally fully clothed (often, indeed, to the extent of coonskin coats which must be worn to be seen) and those in the higher seats are located where normally the atmosphere is warmest. A separate supply fan is provided which may be operated whenever required to force additional air into the room through adjustable louvres in the risers of the seat banks, at lower temperature than that supplied through the grilles at the base of the walls around the pool deck. In order to avoid a down-draft of this extra supply of cooler air, it is exhausted into the attic space over the room, whence all vitiated air is discharged by a separate fan through automatic louvres in an outside wall of the attic space. All fans used have been designed large enough to provide the required air at low velocity in order to avoid drafts. Condensation is avoided by the generous supply and slow movement of fresh air, and by constructing the room so that humid air will not come in contact with excessively cool surfaces. This is accomplished by having air spaces in the exterior walls, double-glazed windows, and a fully ventilated attic space.

The Mechanical Equipment

The mechanical devices necessary for the proper operation of the three pools are somewhat complicated, since they must provide for delivering, recirculating, filtering, sterilizing, heating and draining 370,000 gallons of water on the basis of an 8-hour turnover. It is absolutely essential that sufficient space be provided in connection with any natatorium for the proper location of each piece of apparatus, not

only that it may function properly with other equipment with which it must be coordinated, but that it may have sufficient free space about it for operation, maintenance and repair. As indicated by the accompanying mechanical equipment diagram, the space provided in the Ohio Natatorium is 14 feet wide and 110 feet long, located between the foundations of the exhibition and the class pools. The complete piping system is shown on the diagram, with coordination of the following apparatus:

Four 46,000-gallon vertical pressure filters, each with flow indicator.
Two automatic alkalinity and coagulant feeders—one for lump alum and one for sal-soda, with 170-pound capacity for dry reagents.
Three automatic proportioners, for regulating equal flow of water to or from any pool.
Three instantaneous heaters, operating from 40° to 80° F., with steam at 1 pound pressure, and supplied with automatic thermostatic control.
Two chlorinators for dispensing chlorine gas into the water delivered to the pools.
Three recirculating pumps, each with motor and starter.
Three hair and lint catchers in the suction lines of the recirculating pumps.
One suction sediment remover pump with accessories.

The design and installation of this equipment should be such that one manufacturer or installing contractor should have the sole responsibility for guaranteeing its proper operation. It goes almost without saying that the intelligent operation and maintenance of a plant whose satisfactory use depends upon the proper coordination of this large variety of mechanical devices is quite as important as

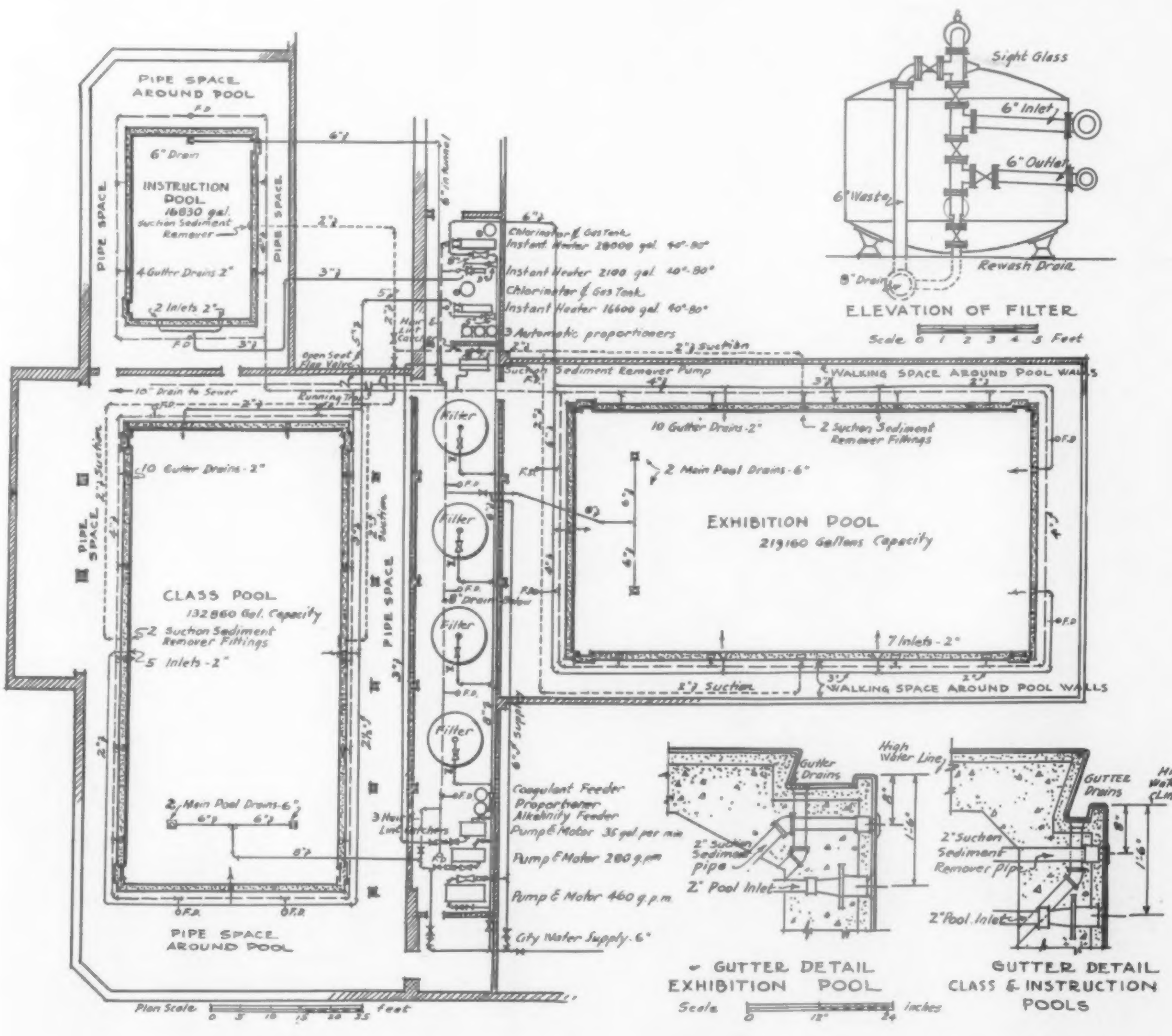


Diagram of Plumbing System and Mechanical Equipment for Three Swimming Pools

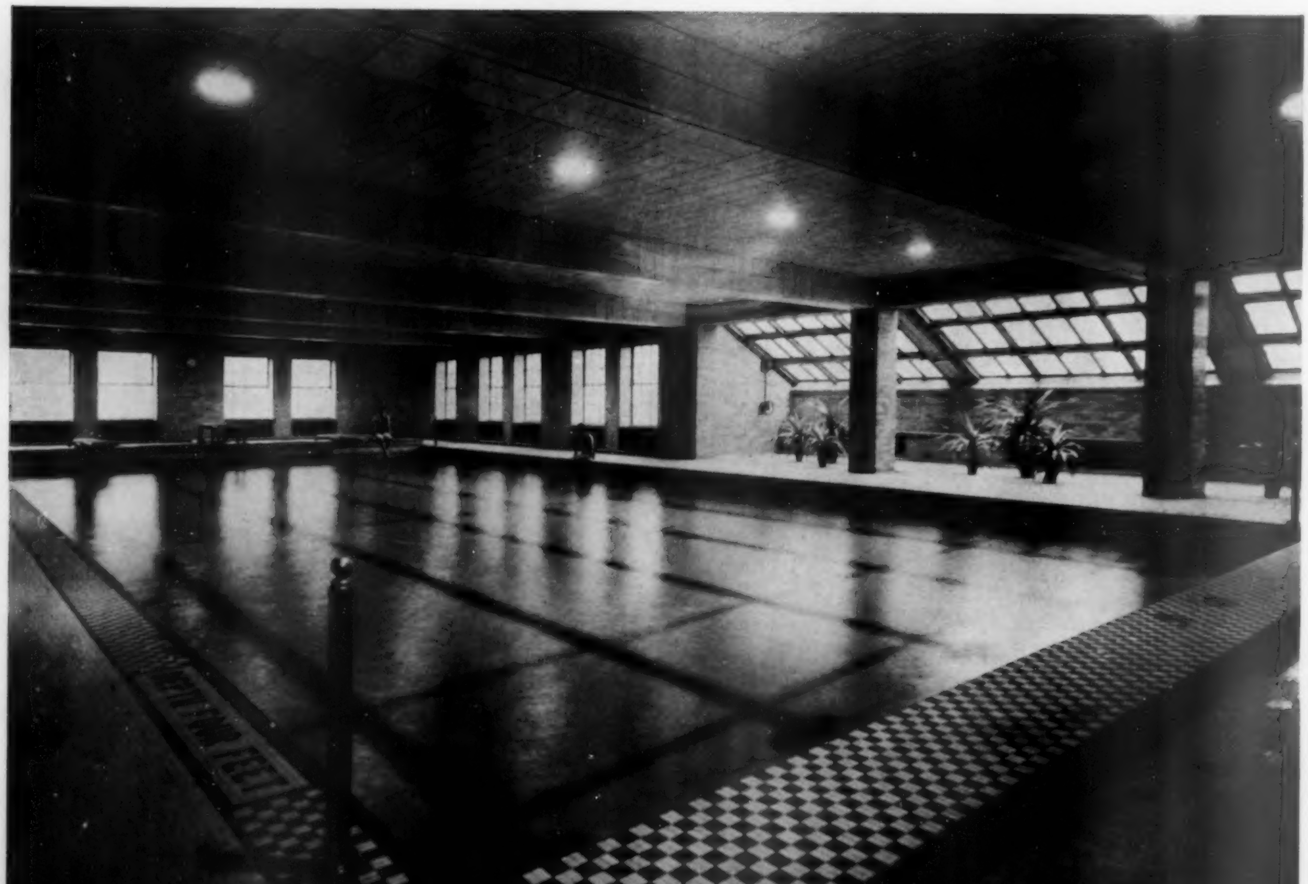
The recirculation of water from the swimming pools through filters for complete reconditioning on an eight-hour basis, requires that the piping system of supply and drainage must be completely cross-connected. In the accompanying diagram the lines to the pool inlets, and the lines from the main pool drains, which form this recirculation system, are shown in solid lines. The waste system from the scum gutters of the pools and from the floor drains, which has no connection with the recirculation system, is shown in dash lines. The suction system, for the removal of sediment from the pools, is shown in dotted lines

Left—The Instruction Pool

This pool is for instruction to non-swimmers, and is not used for competition. It is 20 feet wide, 30 feet long, and 3 to 4-1/2 feet deep

Below—The Class Pool

This pool is 35 feet wide, 75 feet long, 4 to 9 feet deep. It is used for regularly scheduled classes in physical education. There are three regulation diving boards at the far end, and an open roof solarium on the side of the room. The class and instruction pools are lined with white vitreous tile, the pool deck floors are tan vitreous tile, the walls are tan salt-glazed brick, and the ceilings are painted cork slabs



Above—The Exhibition Pool

The pool is 40 feet wide, 75 feet long, and 7 to 12 feet deep. The color scheme is predominately green with shades of tan and silver. The pool is lined with white vitreous tile, the deck floors are green vitreous tile, the wainscots are mat-glazed tile, the exposed walls and ceilings are painted cork slabs, 1-1/2 inches thick. The seat banks are painted concrete, with wood-slat seats for 1,500 spectators. Spectators enter the amphitheater through four doors, two at the top of the seat tiers directly from the stair halls, and two at the intermediate aisle level adjoining the office corridor, with no direct access to the floor deck around the pool. Participants enter the pool area under the seat banks at the end of the pool, and return to the drying rooms through the portal exits at the corners

Below—Exterior View of the Amphitheater

The three large openings in the center of the building light the Exhibition Pool, and the groups of openings of varying heights indicate the sloping seat banks of the amphitheater. These openings have two sets of windows with a ventilated air space between to prevent condensation and excessive heat loss

its original design and construction. During the active part of the school year, and particularly during the heating season when the proper operation of the ventilating system is important for the convenient use of the building, all this mechanical apparatus should be in direct charge of a competent full-time custodian.

Building Costs

A brief summary of the costs of the structure in 1931 will be of interest at this point:

Item	*Contract*	*Cost Per Cu. Ft.*	*% of Total*
General construction	$241,000	22.1¢	78. %
*Heating and ventilating	27,000	2.5¢	8.8%
*Plumbing	35,000	3.2¢	11.3%
Electrical work	5,300	.5¢	1.9%
Total.............	$308,300	28.3¢	100 %

Suggested Major Improvements

Naturally, these nine years of use have suggested several changes and improvements in the Ohio State Natatorium and its equipment. Many of them are refinements of varying importance which could easily be accomplished, and which we recommend for consideration by those who are interested in the design and construction for physical education in aquatics. There are two major items, which we would mention first, however. We will make the assumption that it may be considered desirable in an ideal layout to have a diving bay separated from the swimming pool, but contained within the exhibition amphitheater, as is the case in many modern outdoor pools. In the Ohio plan, economy of space and further cost of construction prevented the consideration of a layout of this kind. As an improvement over the present layout, however, we would consider reversing the so-called "working" end of the pool, placing the diving-boards at the north end. This would remove the supporting apparatus from the "administration" area and would tend to distribute the participants in diving and swimming events more generally about the pool deck. Instead of one 3-meter and two 1-meter boards, we suggest replacing one 1-meter board with a combined 5-, 8- and 10-meter platform or tower, which would meet international requirements for diving competition. In this revised scheme the tower would occupy the center position, with the 1-meter board on one side and the 3-meter board on the other. To accommodate this revised diving layout, we would suggest the following pool depths: shallow end retain 7-foot depth, deep end 12 feet against end wall and at sides, with an additional depth of 15 feet over an area 25 feet square directly under the end of the 10-meter platform. This major rearrangement of the pool would involve no other change in seating or in architectural details.

* Heating and plumbing were in a single contract. This division is computed from the contractor's nominal division of costs.

The second major change which we would suggest for the convenient operation and maintenance of the three pools has to do with the filtration and recirculation of water. It will be noted from the accompanying diagram of plumbing system and mechanical equipment that the water from all three pools is carried through one system of equipment. We would consider the complete separation of the exhibition pool from the class and instruction pools, for several reasons. In the first place, the water level of the exhibition pool is 4 feet higher than that of the other two pools. In spite of leveling and pressure devices, there is a tendency to lose water from the higher pool and overflow the lower pools. The separation of the system would also permit the control of water temperatures in the separate pools. The water in the class and instruction pools should ordinarily be kept at 76° to 80° F., while the exhibition pool water may be kept at approximately 70° or even as low as 68°. Economy of operation might also result in such separation, since the larger volume of water and the smaller number of participants in the exhibition pool would require less intensive filtration than the other two pools when they are in regular scheduled use.

Suggested Minor Revisions

In addition to the two major revisions suggested in the preceding paragraphs, we would suggest consideration of the following minor items:

(1) The exhibition pool should be 42 feet wide instead of 40 feet. This would provide six regulation 7-foot lanes for swimming competition.

The class pool could be reduced from 35 feet in width to 25 feet. The original width had in mind the use of the pool for intramural competition. The necessity for this is avoided, since the exhibition pool can be used for the limited amount of this activity which exists. For all regular physical education class purposes the 25-foot width is sufficient.

The instruction pool should be 25 feet wide and 40 to 50 feet long, the depths ranging from 3 to 5 feet. The importance of this pool in the physical education program of a Middle-Western, landbound school, is appreciated when it is realized that approximately 15 per cent of the students enrolling each year cannot swim, and nearly half the members of the student body are classified as elementary swimmers. In the present pool a class of 20 may be handled conveniently. In a larger pool, the same instructor could just as easily handle a class of 30 or 35.

(2) The decks around the pools slope toward the gutters, and this method of drainage is considered quite satisfactory, since it tends to keep the deck space dry. We would, however, consider changing

this so that the decks would slope away from the pool. This would require additional drain outlets and would increase the cost of the plumbing system, but it would facilitate the cleaning of the decks and avoid splashing the wash water over into the pool. Hose connections for washing down the decks should be provided at both ends of the 75-foot pools.

In the class and instruction pools, scum gutters should be provided at the ends as well as at the sides. Gutters are omitted at the ends of the exhibition pool, providing flat end walls which facilitate racing turns. We think that this combination of flat end walls and low gutter design in the exhibition pool reduces the amount of water surface disturbance and therefore makes faster competition possible. The omission of competitive events in the small pools makes the flat ends unnecessary, and the drainage gutter is more desirable for general use, especially in the case of inexperienced swimmers.

(3) In the exhibition amphitheater the natural lighting would be improved by placing a skylight over the north end of the pool, similar to the one now located over the south or "working" end of the pool. The system of artificial lighting could be increased by 30 to 50 per cent. This might be easily accomplished simply by increasing the lamp wattages of the floodlights from 150 to 200 or 300. The present system of underwater lighting in the walls of the large pool has proved very satisfactory, and is often used as the only source of lighting for pageants and exhibitions. In addition to the floodlight openings in the side walls of the large pool, which are accessible from the tunnel around the pool, we suggest the addition of at least two large window panels through which underwater movements of swimmers and divers may be observed, for coaching and teaching purposes.

(4) In the seating arrangement of the amphitheater, the seat steps are uniformly 30 inches wide and 21 inches high. This gives a uniform sight line from the amphitheater to the water level. We suggest, as a refinement of the sight line, that the first four rows of seats be lower, say 18 inches in height, and the upper four rows increased to 24 inches, leaving the middle four rows 21 inches. We think this would improve the spectators' view to the water level.

We also suggest the placing of a public lobby with ticket booth at the north end of the amphitheater, to provide incidental access by the public on special occasions, under proper control, without having to go through the interior corridors of the Natatorium and Gymnasium. We also suggest that a room be provided adjacent to the pool, which may be used as a waiting room by swimmers and divers between competitive events. This room should have a window for viewing events in the large room, and should be arranged for separate control of its heating, with complete avoidance of drafts.

(5) All metal parts in and around the swimming pools, the decorative railing, balcony, etc., in the amphitheater are of bronze metal. The doors and door frames in and about the toilets, showers, steam rooms, etc., which are subject to a greater amount of moisture, are of steel base metals. Experience indicates that these should also have been of bronze or some non-corrosive metal.

In the main shower rooms, used by regularly scheduled classes in physical education, 12 shower heads have been provided. Because of the limited time between scheduled classes, this number seems too small for these rush periods. We suggest increasing the number to eighteen or twenty, for convenience of the students at these times. The number of shower heads in the rooms adjoining the exhibition pool is excessive, however. There are ten in the west shower room and eight in the east room. Since there are no rush periods for the use of these showers, the number could be reduced to four heads in each room without appreciable inconvenience.

The long, low, perforated pipe sprays provided in the passageways between all shower rooms and the entrance to the pool rooms, referred to as the "crotch spray," have been removed. These were originally included in 1931 as a sanitary measure because of their use elsewhere throughout the country, particularly at the Naval Academy Natatorium at Annapolis. Our experience indicates that we do not require them.

(6) An additional feature which we would add would be a "land-diving" pit. This would require space for a springboard and a sand-pit about 20 feet wide by 25 feet long for land practice in developing diving skills. This method of teaching diving techniques is quite effective and saves much instruction time.

Conclusion

It has often been said, when a family wants to build a home it should really build two; one to learn from and one to live in. This would prove an expensive experience, of course, and the same is true of building natatoriums. At Ohio State we are not ready to trade our present Natatorium for any other one we have yet seen. Even today, when we check it with the standards set by Prof. Frederick W. Luehring of the University of Pennsylvania, we find that it contains none of the 31 common swimming pool errors listed in his comprehensive article in the 1940 Edition of The American School and University. We hope, however, that our experiences of satisfactory operation over these nine years will prove helpful to others who are going to build.

PLANNING LOCKER AND SHOWER FACILITIES FOR PHYSICAL EDUCATION

By I. O. FRISWOLD

Director, Buildings and Business Administration, Minnesota State Department of Education

INADEQUATE space and service facilities for physical education in public school buildings are doubtless due, in many instances, to the fact that the buildings were planned and constructed at a time when physical and health education programs as we know them today had not been developed. Lack of funds, in some cases, has unquestionably also been a factor. In many schools, however, in both new and old buildings, inadequate provisions for housing physical education activities can be explained only by lack of information and lack of planning.

The need for indoor gymnasiums and, in some cases, for swimming pools and for outdoor play areas, is usually more obvious than the need for adequate auxiliary facilities. This may account for the fact that in many states it is the rule to find inadequate, poorly planned locker and shower facilities for physical education in public school buildings.

The following check list has been prepared with a view to assisting public school officials and others in planning public school locker and shower facilities for physical education. Attention is called to questions that should be considered in planning such facilities, and an attempt has been made to present pertinent suggestions. It should be clearly understood, however, that the primary purpose of the check list is to raise questions for the consideration of planners, and not to present immutable standards which locker and shower provisions should meet. It is both desirable and necessary that such provisions should be planned, in every case, with local and specific program housing needs in mind. However, presentation of suggested standards as well as questions or points that should be considered in planning locker and shower facilities may, and I trust will, prove illuminating in relation to specific local problems.

Check List for Planning Public School Locker and Shower Facilities for Physical Education

I. Program

For what physical education program must dressing and bathing facilities be provided?

1. With what classes or years in school will a physical education program requiring pupil use of locker and shower facilities begin and end?
2. How many boys and how many girls will be enrolled?
3. How many pupils, minimum and maximum, will be assigned to each class section?
4. How many periods each week will each class section be scheduled to use locker and shower facilities?
5. Will a swimming pool be provided or more than one gymnasium?
6. Will classes be scheduled in the pool and in one or more gymnasiums during a given class hour?
7. Will the schedule provide for overlapping classes?
8. How much time will be allotted for dressing before class and for bathing and dressing after physical education periods?
9. To what extent will out-of-school groups use physical education facilities?
10. What future extensions or modifications of the program may be anticipated?

Questions such as these must be asked and answered before an adequate basis can be secured for planning locker and shower provisions for physical education.

II. Location

Locker and shower facilities should be located so as to provide ready and direct communication to and from them and gymnasiums, pools, playfields, and classrooms. Ideally, they should be located adjacent to and on the same floor levels as the gymnasiums and the natatoriums they serve, but in addition to (1) accessibility, it is important that consideration also be given to (2) the availability of adequate space and (3) proper segregation of such facilities from the public.

III. Space Provisions

Service facilities, in addition to locker and shower rooms, are needed. Instructors' offices, examination rooms, towel rooms, laundry service, drying rooms, storage rooms, and, where athletic teams or community groups also use physical education facilities, team rooms and auxiliary locker, shower, storage and office provisions must, in many instances, be provided. In every case, adequate provision for toilet facilities should be made.

Although attention is here called to the necessity of considering the need for other space provisions in connection with locker and shower rooms, such facilities

must be determined by the local program. To the extent that health, recreation, and physical education programs are determined in advance and clearly visualized in operation, to that extent will it be possible to anticipate the need for various types of space provisions, including locker and shower facilities.

IV. Layout of Space Provisions

Proper placement or arrangement of such space provisions as are made should be given careful thought. Utmost consideration should be given to this point to eliminate cross-traffic, reduce pupil travel to a minimum, avoid points of congestion, promote hygienic conditions, and simplify the administration and supervision of service facilities.

1. Ideally, instructors' offices should probably be located between the pool or gymnasium and the locker rooms so that a view of both can be secured from them. If this is not feasible, they should be located so as to permit a view of the locker and shower areas from them.

2. Towel rooms, if such are provided, should be located either near the door opening on a public corridor through which pupils enter or leave the locker room, or adjacent to the drying room.

3. Locker-room toilet facilities should be readily accessible from the line of travel of pupils to the shower room. Water-closets or urinals should not be located in the shower room itself or the drying room for bathers. Likewise, they should not be located at the end of the locker room most remote from shower facilities.

4. Where swimming pools are present, the layout should be such as to route pupils from locker rooms to toilets to showers to foot-baths to the entrance of the natatorium.

5. Examination rooms should adjoin both the instructor's office and the locker room. Where training rooms are provided, they should adjoin team rooms or locker rooms.

6. Drying rooms for bathers should be so located that they are entered from the shower areas and open directly into locker rooms or dressing space.

7. Drying rooms for suits, basket lockers, or equipment should be located to provide direct access to them from dressing and locker areas.

8. Storage space for supplies or physical education equipment should be placed with due regard to accessibility under conditions of use.

V. Locker and Dressing Rooms

The number and placement of these facilities will be determined by the number and location of gymnasiums or swimming pools provided in the school plant. The dimensions and interior arrangement of a given locker and dressing room should be based upon the sex and number of pupils which must be accommodated, the largest number that must be cared for at a given time, and the type of locker system or dressing facilities that are provided.

Locker and dressing provisions may consist of any one of several types. The more common provisions are the following:

1. *Individual lockers.*—Each pupil is assigned a full-length or double tier locker equipped with a lock, preferably a combination lock which can be opened with a master key. This is suggested only for the smaller schools with not more than one or two sections of boys' or girls' physical education classes.

2. *Combination common and box lockers.*—Each pupil is assigned a box or gym-suit locker. For each five to seven box lockers, a larger or full-length locker is provided in which, at different times, five to seven pupils keep their street clothes during physical education periods. Padlocks on pupils' box lockers are used on the larger street-clothes lockers during class periods.

3. *Combination fixed and basket lockers.*—A sufficient number of full-length lockers are provided to care for the number of pupils in the largest class section. Each pupil is provided with an individual basket locker for gymnasium apparel. Basket lockers may be kept in a special basket locker room under the control of an attendant who distributes them to pupils, or they may be housed in metal racks which can be wheeled to and from a basket locker storage room. Under these plans, only the basket lockers for a given class are accessible to pupils during a given class period. The basket lockers of pupils not in class are fully protected, and special provisions can be made to ventilate the basket locker storage room to dry apparel and eliminate offensive odors. This plan can be recommended for public schools having two or more sections of pupils in boys' and girls' classes.

There are several other types of locker equipment and dressing provisions which prove satisfactory for public school buildings. In every case, however, locker and dressing room provisions should be planned in relation to local school needs and the size and form of the space allocated for these purposes. In this connection I wish to make the following suggestions:

1. Fixed lockers should be arranged with due regard to windows to assure the most effective natural illumination that can be secured.

2. Lockers large enough to accommodate street clothes properly should not be less than 1 foot x 1 foot x 30 inches in size.

3. If double-tier lockers are installed, a sufficient number should be provided so that only one of each two lockers would be used during a given class period.

4. Benches preferably should be fastened securely to the floor and provide not less than 12 and preferably at least 18 linear inches of seating space for each pupil in the peak load. They should be placed not less than 1 foot 6 inches from the lockers to insure adequate dressing space.

5. Care should be exercised to provide well-planned, adequate communication from locker or dressing space to other facilities such as basket lockers, toilets, showers, etc. Main aisles should be 4 feet wide, and where two benches serve opposite rows of lockers and run parallel to each other, a minimum clearance of 20 inches between benches should be sought.

6. Fixed lockers without legs should rest on raised platforms about 4 inches high. In any case lockers should be designed to permit ready cleaning of the floor and prevent accumulation of dust and refuse under them.

VI. Shower Facilities

Most shower rooms do not have a sufficient number of shower heads for the number of pupils that must be served. The number of shower outlets that should be provided depends not only on (1) the number of

pupils in the largest class, but also on (2) whether gang or individual cubicles are provided, and on (3) the length of time that is allotted for bathing and dressing.

At present, it is encouraging to note that there is a marked trend in the direction of gang showers for girls as well as boys. Gang showers require less floor area, involve a smaller initial outlay, require less operating cost, and can be more effectively supervised, maintained, and kept clean than the same number of individual showers. It is highly desirable, however, when gang showers are provided for girls, that they should be supplemented by one or more individual shower and dressing cubicles.

Where gang showers are provided, one shower outlet suffices for three to five pupils. Where individual showers are provided directly accessible to one or more dressing cubicles, one shower should be provided for one to three dressing cubicles.

Relative to shower provisions, the following additional suggestions are presented:

1. It is important that the amount of shower-room floor area provided per shower head be ample. Fifteen to 20 square feet per shower outlet should be provided.

2. In connection with gang showers, it is desirable that a drying room or platform for bathers be provided large enough to allow at least 15 square feet of drying space floor area for each three to five pupils in the peak load or largest class section.

3. The disadvantages of the lane, zone, or progressive battery showers probably outweigh their advantages except where pupils or others are required to pass through a spray before entering the swimming pool.

4. Side-wall fixtures with pipes accessible from plumbing chamber or exposed in shower room are preferable to overhead plumbing and fixtures. Chrome fittings, non-corrosive concealed piping, fixtures bolted through walls to withstand rough use, and as tamper-proof as possible, are desirable.

5. Shower heads should be ball and socket instead of rigid type, self-cleaning, and such as to conserve water by restricting spread of shower spray.

6. Mounting height of shower heads should correspond to shoulder height of pupils, and mounting height of soap dispenser should be 2 feet lower and the mixing valve about 2 feet 4 inches below that of the shower heads.

7. Individual shower control by means of a mixing valve for hot and cold water for each outlet is satisfactory, but thermostatic control of maximum hot water temperature should be provided. Central control by an attendant is probably preferable for children in primary grades, but intermediate grade, junior and senior high school pupils should be taught to be self-sufficient. Some schools, however, find it highly desirable to control the temperature and supply water by means of a valve operated by the instructor. Where such installations are made, it is desirable to have one or more shower heads under individual control so that not all outlets need be used when only one or two persons wish to use the showers at a given time.

8. Showers and drying rooms for bathers should be drained to the sides instead of the center of the floor. Drains should be ample to care for the run-off at peak loads.

9. Shower rooms should be fully partitioned off from locker or dressing space, but cased openings without curtains should be provided for direct communication. The use of cloth curtains should be avoided; privacy and protection from water might better be achieved by the use of appropriate partitions.

VII. Auxiliary Service Facilities

Well-planned shower and locker rooms should be provided with facilities in addition to bathing and dressing facilities as such. Among these, attention should be paid to the following:

1. *Sanitary Fixtures.*—Shower and dressing rooms should never be located in regular toilet rooms, but every locker room should be provided with a sufficient number of water-closets, urinals, and wash-bowls to care adequately for the needs of the number of pupils in the largest physical education class.

For a class of 40 boys, one urinal, one water-closet, and one lavatory, and for a class of 40 girls one wash-bowl and one water-closet represent minimum provisions.

2. Soap should be supplied in connection with showers and wash-bowls, preferably in the form of liquid soap with one manually operated dispenser to serve each wash-bowl, each individual shower cubicle or each two gang shower fixtures. Cake soap is preferred by some, and particularly in shower rooms, and for such, appropriate wall receptacles should be provided. Powder is effective, but requires individual containers. Liquid soap has the advantage of being economical, and it can be piped to outlets from a central source where the supply on hand can be readily determined or replaced with a minimum of effort and delay.

3. Hair-drying equipment should be considered essential in every girls' locker room, and particularly so if a swimming pool is operated. Individual hair dryers have certain advantages, but, everything considered, a series of outlets to which heated air is forced by a centrally located blower appears more desirable. Hair-drying equipment usually is not provided in boys' locker rooms, but a minimum of one dryer for each ten or fifteen boys should be supplied. It appears that about 85 per cent of the girls using the swimming pool during a class period find it necessary to use hair dryers. If less than fifteen minutes is allotted for shower, dressing, and hair drying, one hair dryer for every two girls appears necessary.

4. Few dressing rooms are supplied with a sufficient number of mirrors. Ample mirror space should be provided, with needs of smaller as well as larger pupils in mind, and preferably should be located on the wall in line with the exit leading to study or classroom facilities rather than above wash-bowls.

5. Paper towels housed in suitable dispensers should be located so as to be accessible to pupils using wash-bowls; and, obviously, a suitable waste can should be provided near the towel dispenser.

6. A drinking fountain should be provided in each locker room.

7. Foot-bath receptacles should not be sunk in the floor; suitable portable surface type receptacles are preferable.

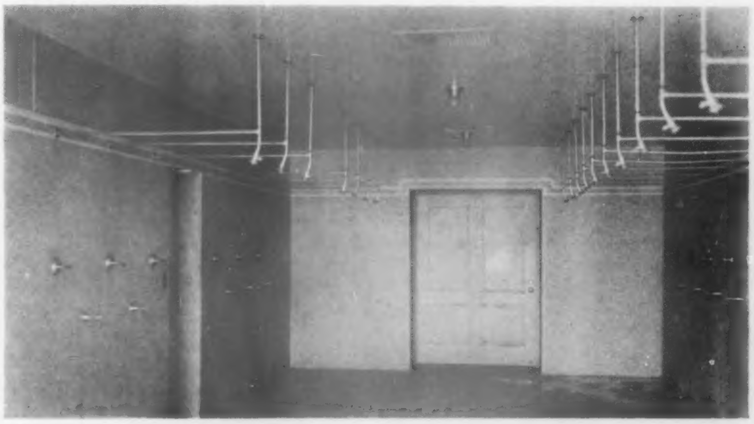
VIII. Heating and Ventilation

Heating provisions should be such as to maintain comfortable temperatures in dressing and bathing areas, and the ventilation system should reduce condensation and eliminate odors without causing appreciable drafts or excessive noise.

1. A dressing room temperature of not less than 72° F. should be maintained. This should be accomplished pri-

Right—One of the best types of overhead plumbing and soap dispenser for a battery of showers. Individual control for each shower, ample floor area, and approved lighting fixtures and ventilation outlets are other good features of this installation

Courtesy of Crane Co.



Above—This is representative of the better type of individual bathing and dressing units. Note the use of exposed, non-corrosive, self-cleaning, individually controlled shower plumbing; the design of aisle, dressing, and bathing areas at different levels; and the excellent workmanship and materials that are used

Courtesy of Speakman Co.

Above—These hair-drying machines are foot-pedal operated. Note the fact that the dryers are set at different heights to accommodate students ranging from short to tall.

Courtesy of Chicago Hardware Foundry Co.

Above—A combination of boxes, double-tier and single-tier lockers has been provided to meet various needs. Right—An attendant replaces soiled garments and towels with fresh ones, operating from the inside of the basket locker installation at the University of Southern California

Courtesy of Fred Medart Co.

marily by direct radiation, or, preferably, by a combination of direct radiation and unit heaters. Automatic temperature control should be specified.

2. Ventilation can best be accomplished by supplying tempered air from a central fan system or unit ventilators and venting it mechanically by means of an exhaust fan through independent vent ducts. Ideally, such vent ducts should be capped by an effective roof ventilator and equipped with back-draft and by-pass dampers or otherwise designed so that air may be vented positively even when the exhaust fan is not operated. Air to be vented can be routed to advantage from locker or dressing space through shower rooms, so that the same vent ducts can serve both bathing and dressing areas.

3. In many instances, it is advantageous to draw air from a gymnasium or corridor into locker rooms through ducts opening at the ceiling line, thereby reducing the cost of the ventilating installation and its operation. It is obviously desirable that, with such air supply, ducts should be designed to insure privacy to locker-room users, and that provision be made for whatever controls are needed to prevent appreciable drafts.

4. Where vent ducts serving basket locker or equipment drying rooms are equipped with exhaust fans, the supply of air to such rooms should be planned so as not to throw the ventilation of locker or dressing space out of balance.

5. To avoid excessive condensation and simplify ventilation problems, shower facilities should be located on or near inside walls, and outside windows should not open directly into shower space.

6. In general, six to ten air changes per hour are needed to secure adequate ventilation of locker and shower rooms.

IX. Illumination

1. A minimum of 5 foot-candles of illumination, and preferably at least 10, should be provided. Natural illumination has much to commend it, but it is not essential where artificial illumination is adequate and locker and shower rooms are properly ventilated.

2. Luminaires for shower rooms should be moisture-proof, and all fixtures should be chosen and installed to make them as tamper-proof as possible.

3. A floor plan showing the proposed location of lockers, benches, etc., should be prepared so that ceiling outlets can be planned to provide light above service areas where it is most needed, instead of directly above lockers.

X. Materials and General Construction

Materials, equipment, and details of construction should be chosen to give the best possible results within existing financial and space limitations encountered in providing such facilities. The nature of the occupancy and the conditions sought also should be given full consideration. The following suggestions are offered:

1. Non-corrosive materials impervious to moisture should be used for floors, walls, ceilings, and partitions. Avoid wood lockers and stalls.

2. *Floors.*—Tile, terrazzo or cement; floors of showers and drying rooms for bathers should be of non-slip material, preferably tile or terrazzo. The slope of the floor of shower and drying rooms should be sufficient to provide rapid drainage during peak loads, but not so great as to make footing insecure. The pitch of such floors toward drains should be not less than ⅛-inch nor more than ¼-inch to the foot. Floors of locker rooms should be designed for adequate and effective drainage; depressions preventing complete drainage should be avoided.

3. *Walls.*—Glazed brick tile ideal, but concrete is satisfactory. Plaster applied directly to concrete or tile will prove satisfactory for locker rooms; in cold climates, exposed walls should be adequately insulated. Glazed tile wainscoting and plaster walls are very acceptable.

4. *Ceilings.*—Plaster cement ceilings, smooth finish for painting and cleaning. Accoustical treatment is recommended and particularly for locker room ceilings.

5. *Ceiling heights.*—Suggested minimum for shower rooms 8 feet; locker rooms, 10 feet. Recommend 10 feet to 12 feet, depending on size of floor area; in no case should clearance be less than 8 feet between floors and bottom of ventilation ducts.

6. *Partitions.*—Gang shower partition walls should be constructed of glazed brick tile. Marble is ideal material for individual dressing and shower cubicles.

7. *Floor drains.*—Adequate drains should be provided for drying and dressing areas as well as showers, such drainage to be away from line of travel or occupancy of pupils.

8. *Windows.*—Place window sills 5 or 6 feet above floor level. Use glass brick or obscure glass for basement, ground floor, or other exposed locations. Frames and sash should be of moisture-resistive material.

Fig. 1—Bituminous concrete is used in the game and apparatus areas of the playground in this large urban project in a northeastern city. Approximately 75 families per acre are housed in the project's six-story apartment houses; eight play areas within the project, and a large city playground adjacent, are being intensively used by the children of more than 2,500 project families

PLAYGROUND SURFACING

By A. C. SHIRE

Technical Director*, United States Housing Authority

ALL USHA-aided projects provide outdoor recreation spaces for the use of project tenants and the people living in the surrounding neighborhood. As such projects are located throughout the United States and in the territories of Hawaii and Puerto Rico, the problems of determining recreation area surfacing suitable to different climates and different localities are many and varied.

Outdoor recreation areas in housing projects are commonly of two types—small play areas for young children, primarily of the pre-school age, and larger playgrounds for older children and adults. Both types receive intensive and extensive use. This fact, together with the consideration that maintenance costs in housing projects must be kept at a minimum in order to insure low rents, makes it imperative that the play areas be surfaced with materials possessing qualities desirable for play purposes which are at the same time low in initial cost and inexpensive to maintain.

In order to assist in making recommendations on playground surfacing to local housing authorities, USHA engineers have studied playground surfacing in the 52 housing projects built under the Public Works Administration, and have analyzed and compared the experience of school boards, park departments and recreation authorities in various parts of the country. Particular attention has been given to the surfacing of small play areas, since these are the rule on every USHA-aided project, whereas large playgrounds of several acres are included only where required to supplement neighborhood facilities.

As might be anticipated, the period of time for experimentation with play area surfacing of housing projects has been so short that experience in this field has not led to any hard-and-fast rules on which to base recommendations. The type of surfacing selected for each project must be determined by materials available, local conditions such as climate, and the caliber of workmanship to be employed.

The surfacing used for playgrounds or play areas in the USHA-aided projects may be grouped in two categories—soft surfaces, such as clay gravel and grass, and the harder bituminous surfaces. Concrete is recommended only for special uses such as shuffleboard.

* Assisted by P. C. Campbell, H. W. Bressler, and O. C. Fountain.

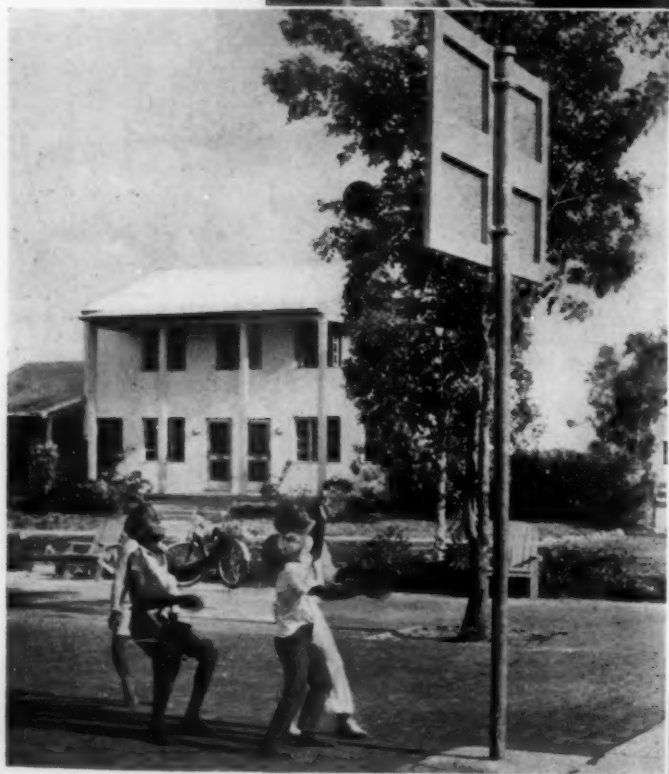


Fig. 2 (above)—In place of a wading pool, this project in a midwestern city uses a large dished area paved in concrete with flush-type spray nozzles spaced at intervals and play sculptures within the spray area. Brick edging is used around the spray area

Fig. 3 (left)—Oiled coral rock is used in this Florida project, which houses fewer than 12 families to the acre and where the playground is consequently not so intensively used as in some of the northern projects. Obviously, this type of surfacing is practical only where a supply of the rock is readily available and inexpensive

Fig. 4 (below)—Special game areas usually require special surfacing treatment. Concrete offers a smooth and level surface—both essential qualities—in these shuffleboard courts in a large midwestern project

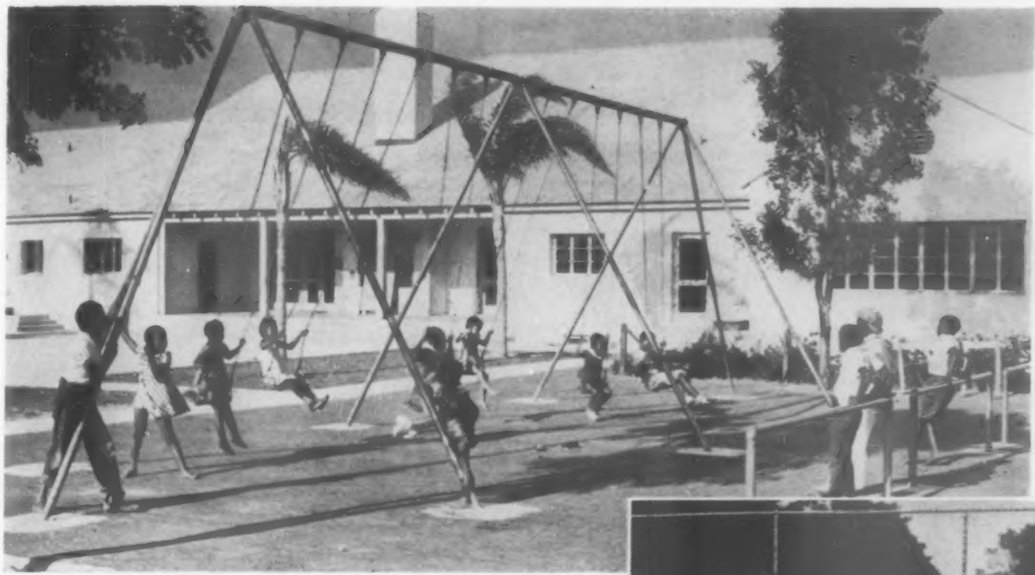


Fig. 5 (above)—Another view of the Florida project in Figure 3, showing an oiled rock play surface, with the supports of the apparatus set in concrete. In southern climates surfaces with an asphalt base are often unpopular with children in the summer because they are soft and sticky

Fig. 6 (right)—Another view of the midwestern project shown in Figure 4. Here the handball courts are surfaced with bituminous concrete, which offers greater resilience than concrete, but is hard enough to permit true bounce of the ball

Fig. 7 (below)—Because bituminous surfacing would have been too hot during the summer months, this Florida project has used shell surfacing. Although abrasive at first, this surface becomes compacted with use. It requires considerable maintenance expense, however

Soft Surfacings

Clay gravel and sand clay have been used with some degree of success in projects where the proportions of the materials were properly regulated. The difficulties of obtaining satisfactory proportions are large. It has sometimes been desirable to make tests in a field laboratory set up for that purpose. The necessity of using dust layers and weed killers introduces a considerable item of maintenance cost. Though the cost of construction of this type of surfacing is considerably lower than that of various types of bituminous surfacing, the maintenance cost is higher. However, in hot climates this type of surfacing is more attractive to children than that containing an asphalt base.

Shell surfacing is a type which has been tried in several projects in cities on the Atlantic seaboard. This type has the same maintenance problems as clay gravel and sand clay. The shell is often sharp when first laid, but when compacted through use, it proved to be successful in a Florida project where a bituminous surfacing would have been too hot during the summer months.

Dirt treated with oil or with a patented type of dust-laying non-staining oil has been used as the surfacing for a few large playgrounds. Obviously, this surfacing cannot be used except in localities where the soil has a sufficient quantity of clay to keep it from blowing dust and in locations where there is good drainage.

Grass is a very desirable material for surfacing if it can be used without the usual high maintenance. This is sometimes possible where the tougher grasses which will grow in the South can be used. On a large playground in an Oklahoma City project, which is constantly used for soft-ball, Bermuda grass has been used with success. It shows no signs of wear.

In localities where coral rock is available and inexpensive (as in parts of Florida), oiled rock has been a satisfactory play area surface.

The majority of play areas and playgrounds already built or under construction in USHA-aided projects have hard surfacing. This type stands up well under the heavy wear of apparatus play, roller skating, hop-scotch and similar games which are always popular with children.

Selection of the type of hard surfacing to be used involves consideration of the particular type best suited to the project and the locality in which it is located. In the field of bituminous surfacing, considerable confusion exists as to the exact nature and relative merits of a variety of patented and trade-name products. Adoption of a particular formula of a patented product will not necessarily produce a satisfactory paving, and skilled workmanship and competent inspection are equally essential.

The Proposed Hard Surfacings

The surfacings proposed for USHA-aided projects fall into three classes:

1. Bituminous concretes and sheet asphalt with a smooth finish
2. Asphalt emulsion and cork
3. Hot-mix cork asphalt

The first-named surfacings, bituminous concretes and sheet asphalt, have been used widely in housing projects, and by school boards and parks and recreation departments. The two other classes are, in our opinion, still in the experimental stage.

Both bituminous concrete and sheet asphalt have resiliency, though they are not as resilient as cork asphalt. When a smooth surface is obtained, they compare favorably with the cork asphalt non-abrasive surface. These two surfaces have the advantage of being easy to lay, since they are standard types with which paving contractors are familiar.

Asphalt emulsion and cork is more resilient than the types noted above. It can be produced without an asphalt plant and does not require as great technical skill as is necessary to the preparation of hot-mix cork asphalt. It is the cheapest of the three classes recommended, but will require maintenance, for an application of emulsion and cork may be needed after four or five years' use.

Hot-mix cork asphalt has the greatest resiliency of the three classes. It is the most expensive. There is considerable difference of opinion as to the percentage of cork to be used and the size of cork particles. It has been observed that where a large percentage of cork is used and the asphalt is soft, although there is great resiliency when first laid, the material is likely to become porous, with resultant disintegration. A smaller percentage of cork and harder asphalt have produced a pavement of less resiliency but greater wearing quality.

Field experimentation with various types of bituminous surfacing is being conducted by the USHA. These experiments include the classes of bituminous surfacing noted, with three formulae for hot-mix cork asphalt, including a formula developed by the Bureau of Public Roads and the USHA.

With the results of these tests added to the experience which will be gained from the operation of play areas in the 220 USHA-aided projects already completed or now under construction, it is hoped that more definite recommendations can be drawn up on play area surfacing.

BENJAMIN ELECTRIC MFG. CO.

General Offices and Factory: Des Plaines (Chicago Suburb), Ill.

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LIGHTING EQUIPMENT FOR SCHOOL AND UNIVERSITY


Football Field


Tennis Court


Softball Field


"Play-Area" Senior


"Ellipto-Lite" Play-Area


"Alzo-Lite" Long Range

There is a suitable lighting unit in the Benjamin line to meet any lighting problem in schools and universities.

FLOODLIGHTS

Benjamin "Play-Area" Senior Floodlights, for 750-1500 watt lamps, meet every requirement of football field lighting. They combine in one unit a large open-type porcelain enameled steel reflector with an inner auxiliary reflector of oxidized processed aluminum. Units are finished green outside, white inside. Available with any of following brackets: cross arm for 4¼-inch wood cross arm, cross arm with pipe clamp, and slip fitter; also available with "Saflox" lowering attachment.

Benjamin "Ellipto-Lite" Play-Area Floodlights are also used extensively in football field lighting. They are of the same general construction as the "Play-Area" Senior (same choice of brackets) but are smaller and less expensive. The 750-1500 watt size is recommended.

"Play-Area" Senior and "Ellipto-Lite" Floodlights also have a wide application in the lighting of baseball fields, softball fields, playgrounds, hockey rinks, swimming pools, stadia, etc.

In football fields where units must be mounted 55 to 150 feet back from the side-lines, the "Alzo-Lite" Long-Range Alzak Aluminum Floodlight with 750-1500 watt lamp is recommended. Supplied either with or without heat-resisting, water-proof glass cover.

Benjamin "Tennis Court" Reflectors are especially designed for the lighting requirements of tennis. Reflectors are of etched Alzak aluminum and take 750-1500 watt lamps only.

REFLECTORS

For effective glareless illumination of gymnasiums, field houses, basketball courts, indoor tracks and rinks, baseball cages, handball courts, etc., the Glassteel Diffuser is recommended. Provides finest quality of soft, well diffused illumination with a minimum of glare. Finished inside and out with white porcelain enamel and supplied in sizes for 150 to 1000 watt lamps.

For the lighting of classrooms and buildings devoted to engineering and vocational pursuits, the Glassteel Diffuser, the RLM Dome or the RLM "Silvered Bowl" Diffuser Unit is recommended. The RLM Dome Reflector is of porcelain enameled steel and provides good uniform illumination over flat and upright surfaces. Finish is green outside, white inside. The RLM "Silvered Bowl" Diffuser combines the qualities of both porcelain enamel and Alzak aluminum reflecting surfaces. Reflector is of porcelain enameled steel, white inside and out.

The same equipment recommended for vocational departments is also suitable for laboratories where moisture, corrosive fumes and combustible vapors are absent. For laboratories where explosive hazards are present, a complete line of explosion-proof and Dust Tight equipment is available; where only moisture and non-combustible fumes are prevalent, "Vapolet" units meet requirements.

For lighting book stacks in the library or shelves and bins in the store room, the "Stock-Bin-Lite" is recommended. Provides uniform illumination from top to bottom of shelves. Reflectors are of porcelain enameled steel, white inside and out.

Glassteel Diffuser

RLM Silvered Bowl


RLM Dome Reflector

"Stock-Bin-Lite"


Gymnasium


Library


Engineering Dept.

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES

NOVALUX FLOODLIGHTING SERVICE

In the past few years the night floodlighting of high school and college athletic fields has increased to a surprising degree, owing to the popular interest in night sports, the added gate receipts, and the opportunities afforded for additional practice. Ask for Bulletin GEA-3218 on football field lighting.

How to floodlight play areas adequately as well as economically, is a problem deserving careful attention. Novalux Floodlighting Service offers the help of a large staff of experienced engineers and lighting specialists to help you obtain the best results at lowest possible cost. Novalux Floodlighting Service comprises:

1. Expert assistance with floodlighting problems at no cost
2. Sizes and types of floodlights suitable for all common applications
3. All floodlights scientifically designed for efficient performance
4. All floodlights manufactured from best quality materials for long life and low maintenance cost
5. Conveniently located sales offices, warehouses and service shops
6. Reasonable prices

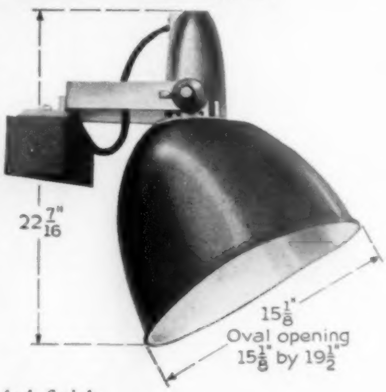
ESPECIALLY RECOMMENDED FOR SPORTS APPLICATIONS—Type L-68 (Alzak Processed Aluminum)

This 1500-watt floodlight is a simplified, low-cost type, but one that has a high efficiency that compares favorably with the most expensive floodlight obtainable. Several useful beam angles and a variety of mounting attachments make this light applicable to the majority of sports applications. It is light in weight, sturdy, and long-lived.

Type L-68, 1500-watt, enclosed, with crossarm bracket

FOR AREA LIGHTING—Types L-45 and L-46 (Porcelain-enameled Open Types)

These inexpensive floodlights are used mainly for lighting medium and large-sized ground areas from poles located in or near the area. For emphasizing small buildings or for greater range, auxiliary insert reflectors are available to build up beam candlepower. Use 750-watt, 1000-watt or 1500-watt general service lamps. Reflectors are die-formed steel with glossy porcelain-enameled finish.



Type L-49, 300/500-watt, enclosed, with base, swivel and stand

GENERAL PURPOSE FLOODLIGHT Type L-49

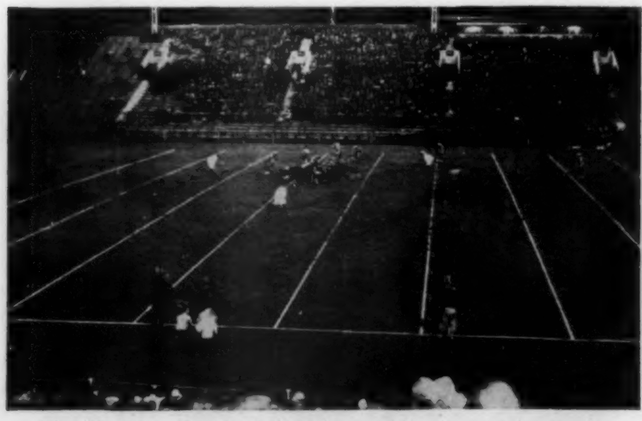
Type L-49 300/500-watt floodlight is a general-purpose floodlight suitable for general utility application. This floodlight, like the Type L-68, shown at the left, is made with its reflector spun from sheet aluminum, polished (specular) or etched (diffused) surface and Alzak processed.

INEXPENSIVE GENERAL-UTILITY HANDY FLOODLIGHT

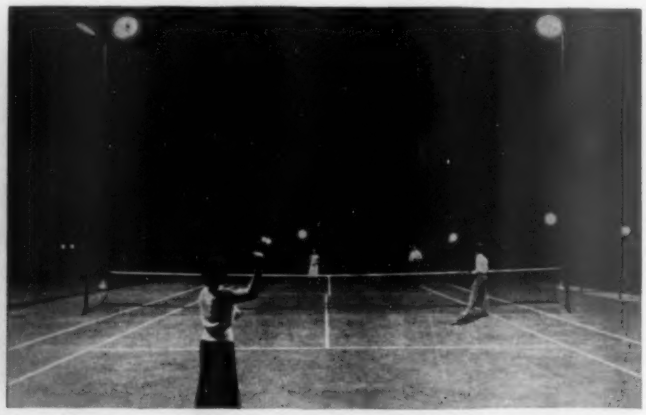
Type L-36 (Enclosed)

Type L-36, 200-watt. Also Type L-65, 100-watt

This simple, low-priced unit is suitable for portable or permanent outdoor installation. It is lightweight, sturdy, durable. The wide-beam aluminum-oxide reflector surface meets most requirements; and for a small additional cost, a selection of beam angles and longer life is obtained with an Alzak processed aluminum reflector.



Floodlighting the football field provides increased attendance, bigger gate receipts, and additional practice time for teams



Floodlighting increases play-time for such sports as tennis, badminton and horseshoe pitching; putting practice on golf greens, skating, hockey, etc.

General Electric recommendations for floodlighting any sport. Any or all of these publications will be gladly furnished upon request

HOW TO PLAN ATTRACTIVE ECONOMICAL FLOODLIGHTING

Floodlights are used for so many and such different purposes that it is practically impossible to reduce floodlighting applications to a few simple rules. However, the average installation involving relatively few floodlights can be designed easily, simply following the general principles and simplified method described on pages 5-7 of our Catalog GEA-1865.

Large projects requiring many kilowatts of lighting deserve careful consideration by engineers of long experience. Likewise, projects that involve unusual lighting effects or special installation or operating conditions call for specialized experience. From our nearest sales office, you can obtain carefully planned recommendations for any project.

For floodlighting of outdoor sports, we recommend that prepared lighting plans which we will furnish upon request be followed as closely as possible.

Type L-53 Fluorescent Floodlight (Aluminum, Enclosed Type)

This floodlight adopts the new fluorescent Mazda lamp to practical and economical floodlighting. Space requirements are small and energy consumption low—thus opening up new opportunities for the liberal use of colored light outdoors. The floodlight is efficient, durable, easy to install and operates inexpensively.

Type L-53 for 18 inch Fluorescent Lamp

A HIGH - QUALITY GENERAL - UTILITY FLOODLIGHT—Type L-29 (Shown at right, Copper-bronze construction, enclosed type)

Type L-29 is recommended for applications where considerable precision of light control is wanted, or where the severity of atmospheric conditions warrants the finest quality obtainable in order to obtain maximum life. This unit offers outstanding efficiency and unlimited life under exposure to weather.

Type L-29, 200/250-watt, with base and swivel-type mounting

Type L-38, 200/250-watt; with portable base

Type L-38 (Cast Aluminum, Portable Enclosed Type)

This simple, sturdy floodlight has approximately the same illumination characteristics as the Type L-29. It is well suited for temporary floodlighting of pageants, and special campus events, or in case of trouble.

SWIMMING POOL FLOODLIGHTING

Underwater floodlighting in a swimming pool provides a novel and attractive appearance, as well as more safety for the swimmer.

Submersible floodlights installed in niches in the wall are well adapted for outdoor concrete pools and where installation cost must be kept at the minimum. Two sizes of floodlights are available for various size pools. The coiled flexible cable is encased in a rubber hose, making it possible to service the floodlight without disconnecting electric or drainage connections.

The dry-niche system, with the floodlight back of a porthole, is ideal for indoor brick- or tile-finish pools. The floodlights are serviced through a manhole in the rear of the unit. Further details will be furnished on request. Ask for Bulletin GEA-2909.

Artistic floodlighting of buildings and monuments is often highly desirable—particularly if the spot illuminated is of historical interest

Underwater floodlighting of swimming pools increases attractiveness and provides an additional measure of safety for the swimmers

CROUSE-HINDS

ESTABLISHED 1897

Syracuse, N. Y., U. S. A.

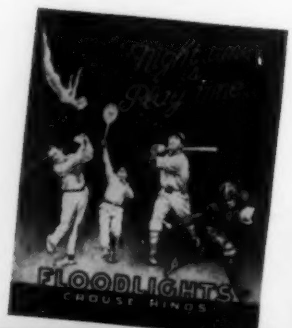
CROUSE-HINDS FLOODLIGHTS
For Night Sports

Floodlight tipped over for convenient servicing

Type MUA Alumalux

Type ADE-16

Bulletin 2299, entitled "Nighttime is Playtime," describes in detail the applications of Crouse-Hinds floodlights to outdoor sports lighting. A copy will be sent on request.



Night sports have been increasing in popularity year after year. Almost every sport shows greater attendance at night than during the day, and floodlighting provides increased hours for indulgence in amateur sport and recreation.

Modern illumination has made night football a most satisfactory game for both players and spectators. Lighted practice fields permit adequate hours of practice which do not interfere with class schedules.

Illuminating engineers have designed lighting systems for almost every kind of sport. Specific plans and descriptions of equipment will gladly be submitted upon receipt of detailed requests.

Type MUA is a universal, open type, 750 to 1500-watt floodlight which has a complete line of interchangeable and detachable reflectors.

Type ADE-16 is a universal 1000-watt unit of sturdy construction and high efficiency. The unit is dusttight and weatherproof, and is constructed entirely of corrosion-resisting metal.

Any light distribution desired, from that of a spotlight to the widest spread floodlight, is available.

CROUSE-HINDS COMPANY
SYRACUSE, N. Y., U. S. A.

WESTINGHOUSE ELECTRIC & MFG. CO.

Edgewater Park — **LIGHTING DIVISION** — Cleveland, Ohio

ATHLETIC FIELDS — Westinghouse floodlights of several types are available to meet specific requirements of schools and universities. They provide efficient illumination for football, baseball and soft ball fields, tennis courts and general school sportsfield lighting. Westinghouse floodlights have long life, are economical to install and operate.

SWIMMING POOLS — Both for indoor and outdoor use, Westinghouse provides a line of Aqualux floodlights to meet every swimming pool lighting requirement. Underwater floodlighting prolongs the use of pools beyond the hours of daylight and insures the safety of swimmers. Aqualux floodlights provide a high standard of efficient and trouble-free performance.

LABORATORIES AND SHOPS — The Westinghouse line of industrial reflectors offers a wide range of selection for use in laboratories, shops, printing shops, gymnasiums, engineering buildings. The new Locklite line of reflectors, the Silvered Bowl Diffuser and the Stack Luminaire are ideally suited for school and university applications. These units offer effective light distribution at low maintenance and installation cost.

Lighting for Sports, Laboratories and Shops

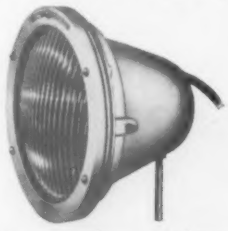
VHR — Aluminum unit, with Swivel Cover, is Designed Especially for Athletic Fields

A-8 and A-10 — Small Lightweight Aluminum Units for Interior or Exterior Floodlighting

AFA-16 and AFA-20—Porcelain enameled, Open Type Units, with Aluminum inner reflectors for Football, Baseball and Other Athletic Field Lighting

WS-8 — Aqualux Underwater Floodlight for Outdoor and Indoor Pools

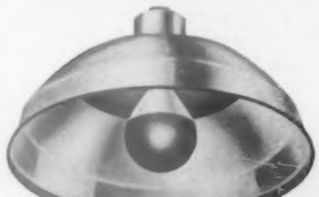
AH-14, AH-16, AH-20—Sturdy, Aluminum Enclosed Units for Building Floodlighting



CS-10 — Aqualux Underwater Floodlight Designed Specifically for 500-watt Lamps in Swimming Pool Applications

Locklite Reflectors are Ideal for all Kinds of Heavy-duty School Applications

Stack Luminaire for Libraries, File and Storage Rooms



Silvered Bowl Diffuser—A new Luminaire that Provides Well-diffused Light for Shops and Laboratories

FRED MEDART MANUFACTURING CO.

3568 Dekalb St. St. Louis, Mo.

Manufacturers of

Gymnasium Apparatus—Basketball Backstops—Telescopic Gym Seats—Automatic Electric Scoreboard and Timer—Steel Lockers—Steel Wardrobes (The Lockerobe)—Steel Shelving

MEDART
Telescopic
GYM SEATS
with Floating Locomotion

Outstanding among the many features of this modern seating is the ease with which seats glide in and out of the "nested" position, in one operation. Use of the telescope principle eliminates the need for any counterbalance mechanism (springs) and consequently there is nothing to lift up or to pull down; no closure panel and no possibility of any parts of the seat falling on the operator. Understructure is of steel; all lumber parts are full length (not pieced) and are of substantial thickness (even the risers are solid, full length selected lumber—no flimsy material used anywhere in the construction). When Medart Gym Seats are installed in a gymnasium it is possible to quickly and easily provide a bench with a comfortable back rest for dances or special classes of instruction by simply withdrawing the one (lower) row of seats from the "nested" position, thus eliminating the need for folding chairs or other auxiliary seating. Medart Gym Seats are fully approved and recommended by the structural engineering department of one of our leading universities as a result of an exhaustive analysis and of actual tests made by these authorities.

Write for Gym Seat Catalog GS-2

GYMNASIUM APPARATUS AND BASKETBALL BACKSTOPS

Medart Gymnasium Apparatus which is today acknowledged as the ultimate in gymnastic apparatus perfection, is the result of continuous, uninterrupted manufacture and constant improvement, since 1873. . . . Likewise the Medart line of Standard and Special Basketball Backstops has kept pace with the growing popularity of this sport. Interested parties are invited to avail themselves of the competent services of the Medart Installation Engineers.

Write for Gym Catalog G-4 and Backstop Catalog BB-2

MEDART AUTOMATIC ELECTRIC SCOREBOARD AND TIMER

Precision built throughout. Streamlined, of all metal construction, the Medart Scorer and Timer weighs only 90 lbs. and is 74" long, 42" high and 5" deep. Black wrinkle finish surface with aluminum border. Translucent clock face of 27" diameter available with 8-minute quarters or 20-minute halves. Lighted (white) from rear until last minute of play when clock face automatically changes to bright red. Clock operates on 110 volt, 60 cycle synchronous movement and is equipped with positive ''dead stop'' brake; stops automatically and sounds extra loud, vibrator-type horn at end of each period. Easily read scoring numerals (6-8 volt lamps with aluminum reflectors) are 8½" high, instantaneously registering (0 to 99) from single scoring and timing control box (size 6" x 11½" x 2½"). Control box furnished with 15' of cable and 10-terminal connector plug. Many other desirable features. **Write for Complete Information.**

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All Steel Grandstands

Patent No. 1,452,467

PITTSBURGH-DES MOINES STEEL GRANDSTANDS are used on all types of athletic fields and for indoor arenas. They are built in standard sections 18 feet long by 10 rows deep, each section seating 120 people. A stand may be any number of sections long by any number of sections deep. Its seating capacity may be increased from time to time, double decked if necessary, and no matter how often enlarged it will always present a neat and finished appearance. A roof may be provided over all or a portion of the stand.

Louisiana State University Division at Monroe, La. Masonry Enclosure. Seating Capacity, 4000

Note the sturdy construction of the deck and supports—clearly illustrated in the two close-up views. Substantial handrails surround the stand, and may also be installed to divide it into sections.

The wood seat planks supported on cast iron or welded steel stools are securely bolted down to the deck. Other types of seats are furnished if desired. Aisles, at proper intervals, extend from front to back with walkways along the front or back if necessary. Entrance or exit is accomplished by means of stairs or ramps at the lower end of each aisle, or through wells in the stand.

Waterbury, Connecticut, High School. Masonry Enclosed Sides and Rear. Seating Capacity, 4400

The steel deck is built to shed water. Hence the space under the stands may be utilized for dressing rooms, toilet facilities, storage, etc. In a number of instances masonry walls have been built along the ends and back so as to totally enclose the space under the stands.

These stands are permanent. They do not weather, rot or decay and therefore will not weaken and collapse. Their first cost is low, and they have a high salvage value. Being assembled by means of bolts, they can be dismantled and re-erected at another location—a feature not possible with other types of construction. An occasional coat of paint, the only maintenance necessary, keeps them looking new year after year.

Write our nearest office for our latest "All Steel Grandstands" Bulletin, and any additional information you may desire.

Southwest Stands—Penn State, State College, Pennsylvania, Seating Capacity, 8160

All Steel Swimming Pools

Pittsburgh-Des Moines All Steel Swimming Pools represent the best value in durability, economy and appearance to be obtained. Lower in first cost than properly-constructed pools of other materials, the P·D M All Steel Pool requires no maintenance other than a coat of paint at reasonable intervals. It is absolutely watertight; withstands frost action and ground movement without harm; is smooth, sanitary and good-looking for a lifetime. P·D M designs, fabricates and erects steel swimming pools complete with all accessories—under a responsible guarantee of satisfaction. Send for our "All Steel Swimming Pools" Bulletin No. 402—and if you wish, a free consultation on your problem.

Summit Hotel, Uniontown, Pennsylvania P·D M All Steel Pool and Accessories

WILLIAMS IRON WORKS, INC.

Designers, Manufacturers of Indoor and Outdoor Grandstands
Sectional — Portable — Permanent Stadia for All Mass Seating Requirements

430 East 102d Street, New York

Above—**Front and Side Views of Permanent Grandstand, Muhlenberg College, Allentown, Pa.**

For more than a quarter of a century the Williams Iron Works have specialized in designing and erecting grandstands, both portable and permanent. Correctness of engineering design, careful workmanship and use of structural steel that conforms to the rigid specifications of the American Society for Testing Material for Structural Steel for Buildings, characterize all Williams Grandstands.

COMFORT, VISIBILITY, SAFETY

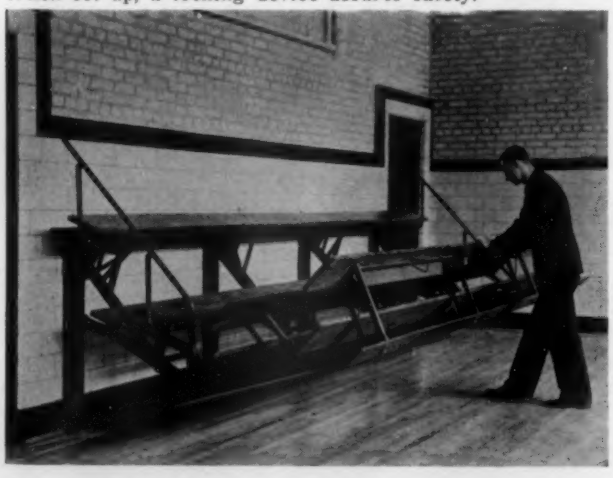
On all Williams Grandstands there is sufficient room between rows to permit free leg room. Footboards are 18 inches wide, providing sufficient walking space. Sections are 16 feet long, and strong steel supports occur every 4′ 6″. Every Grandstand is constructed to hold four times the given load. A rise of nine inches between seatboards provides ample and unobstructed visibility.

WILLIAMS PERMANENT STADIA

Many large permanent steel grandstands both open and canopied have been constructed by this organization. Our staffs of engineers and designers will be glad to cooperate in furnishing comprehensive information.

WILLIAMS "CANTILEVER" FOLDING INDOOR GRANDSTAND (Illustrated below)

The "Cantilever" is a custom-built indoor grandstand that is on a par with the finest type of school construction. Perfectly counter-balanced, it opens and folds with a minimum of energy, and can be installed in any type of gymnasium. When set up, a locking device assures safety.



WILLIAMS "TYPE A" PORTABLE STEEL GRANDSTAND

"Type A" Grandstand is as fine and sturdy a steel portable grandstand as can be built. Seats and footboards are of first quality Oregon fir 1⅛″ thick, smooth planed and edges beveled. "Type A" is supplied in any number of rows from 2 to 50.

WILLIAMS "TYPE F" PORTABLE STEEL GRANDSTAND

"Type F" differs from "Type A" only in having a single instead of double footboard. Because of its low cost, it provides maximum safe seating facilities for the school with a limited budget. It is supplied in any height from 2 to 30 rows. Convenient payment terms can be arranged.

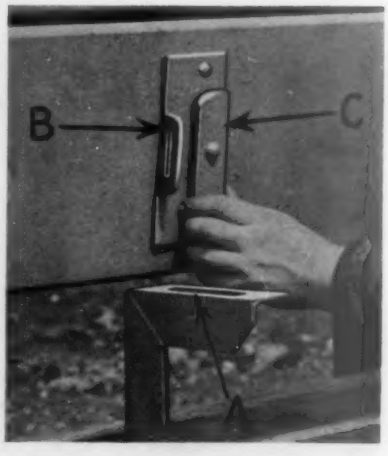
A Few of the Many Recent Installations of Williams Stands

World's Fair, New York
Yankee Stadium, New York
Tropical Park, Coral Gables, Fla.
Boston University, Boston, Mass.
Fordham University, New York
Muhlenberg College, Allentown, Pa.
High School, Montclair, N. J.
Boys' High School, Brooklyn
High School, Kulpmont, Pa.

At right—**Patented "Sta-Tite" Seat Locks**

Exclusive on Williams Grandstands

Seats will not rattle or bob, and are quickly attached to their steel supports. In the top angle of the seat support is a slot "A" into which the slotted projection "B" on seatboard enters. Movable bar "C" is turned into slot "B" and locks the seat securely into place. To remove seatboard, a hammer blow disengages bar "C." There are no loose bolts or removable parts in this foolproof lock.



DURABILT STEEL LOCKER CO.

614 Arnold Avenue, Aurora, Ill.

SALES OFFICES IN ALL PRINCIPAL CITIES

PRODUCTS

Steel Lockers for all purposes
Steel Storage and Wardrobe Cabinets
Steel Gymnasium Racks and Trucks
Vocational School Storage Equipment

LOCKERS

Single Tier Lockers

For clothing storage, the Durabilt Lockers best suited to schools and gymnasiums are the specially equipped full length or Single Tier Lockers either recessed in the walls, on concrete bases, or free standing on legs. Where Single Tier Lockers are not desired, we recommend the use of Double Tier Lockers. Multiple Tier Lockers, or "Box" Lockers are ideally adapted to storage of gym suits, books, sewing materials, etc. Combinations of any of these types, are of course, available.

W. D. H.	Overall Height Including Legs
12x12x60"	66"
12x15x60"	66"
12x18x60"	66"
15x15x60"	66"
15x18x60"	66"
18x21x60"	66"
12x12x72"	78"
12x15x72"	78"
12x18x72"	78"
15x15x72"	78"
15x18x72"	78"
18x18x72"	78"
18x21x72"	78"

Equipment includes hat shelf, one double prong ceiling hook and three or more single prong side hooks, depending on size of locker.

Double Tier Lockers

W. D. H.	Height Overall Including Legs
12x12x30"	66"
12x12x36"	78"
12x15x36"	78"
15x15x36"	78"
12x15x42"	90"
15x15x42"	90"

Coat hooks same as in Single Tier Lockers. Hat Shelf is omitted in Double Tier Lockers.

Multiple Tier Lockers

Lockers High	W. D. H.	Height Overall Including Legs
5	12x12x12"	66"
6	12x12x12"	78"
5	12x15x12"	66"
6	12x15x12"	78"
4	15x15x15"	66"
5	15x15x14⅜"	78"

Hat Shelf and coat hooks are omitted in Multiple Tier (Box) Lockers.

CABINETS

Combination

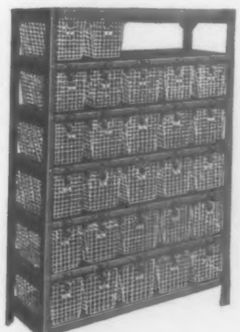
Storage

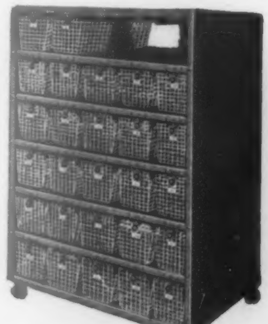
For secure, dust-proof, fire-retarding, germ-proof, and orderly storage of books, catalogs, stationery, and office supplies; for wardrobe and thousands of other uses, Durabilt steel cabinets are outstanding. Write for prices and complete information.

FEATURES OF CONSTRUCTION

1. More storage space inside than other cabinets of same size.
2. Heavy gauge steel doors, pan reinforced full length.
3. Shelves adjustable up and down on one inch centers without use of tools.
4. Large steel gliders on four corners of bottom make it easy to move cabinet and prevent damage to floor.

BASKET RACKS AND TRUCKS





The use of steel racks and wire baskets is often preferred to Multiple Tier (Box) lockers. This system is less expensive and gives the advantages of complete ventilation and makes the contents visible for inspection at any time. The security and orderly appearance of the box lockers is, of course, sacrificed to some extent. The illustration at the left shows the single row, skeleton type, Basket Rack with baskets in place. This rack has a capacity of 30 baskets and consists of steel shelves with angle uprights, basket separators and padlock hasps which permit locking of the baskets in place. The illustration at the right shows the double row Basket Truck, built with solid ends and casters instead of legs, for portability.

AMERICAN PLAYGROUND DEVICE CO.

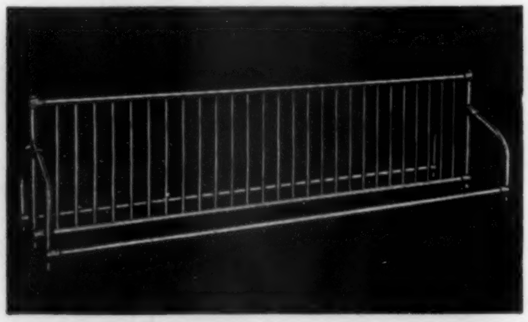
Anderson, Indiana, U. S. A.

Foremost Manufacturers of Foot Baths for Athlete's Foot—Chain Link Tennis Nets Gym Mats—Floodlights—Diving Boards—Bicycle Racks—Playground and Pool Equipment

PRODUCTS

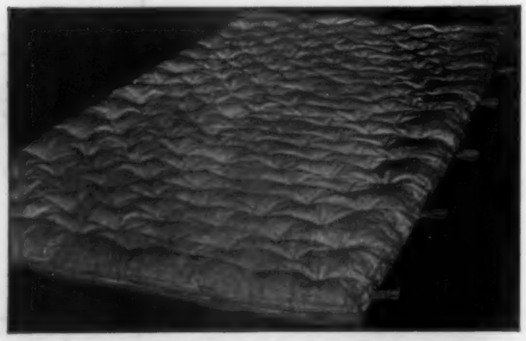
American School Equipment includes Gym Mats—Foot Baths — Diving Boards — Pool Equipment — Chain Link Tennis Nets — Ornamental Playground Fence — Playground Equipment and Bicycle Racks. Send for information and prices — please mention name of item in which you are interested.

AMERICAN BICYCLE RACKS



American Bicycle Racks are the permanent solution to that "Bicycle Parking" problem—used nationally.

AMERICAN GYM MATS



American Gym Mats are springy and resilient—offer greatest economy and durability.

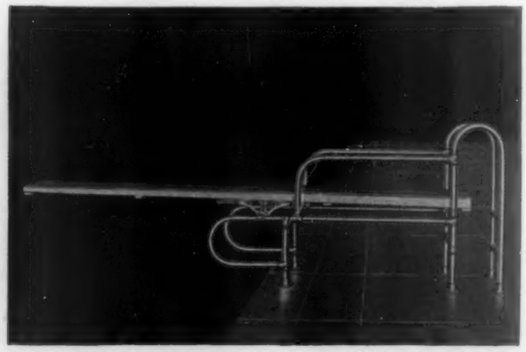
GUARANTEE AND SERVICE

American products are Approved and Specified by leading School Authorities from Coast to Coast. Each item fully guaranteed—all shipments made promptly, no waits or delays.

FOOT BATHS FOR ATHLETE'S FOOT

American Foot Baths and Hypochlorite are guaranteed to kill Athlete's Foot Fungi in less than 30 seconds.

SWIMMING POOL EQUIPMENT



American Pool equipment is foremost in construction and performance—Use American Official Regulation Diving Boards for dependability.

CHAIN LINK TENNIS NETS

American Playground Equipment is built strictly in accordance with the recommendations and specifications of prominent Recreational Leaders whose expert opinion is based on years of actual experience.

American Chain Link Tennis Nets lead in durability and performance—Used by nation's largest Schools and Colleges.

American equipment is designed and built for utmost durability, strength and safety. **Send now for our new completely illustrated playground equipment catalogue.**

AMERICAN PLAYGROUND DEVICE CO.

Anderson, Indiana, U. S. A.

Manufacturers of Playground Equipment—Swimming Pool Equipment—Diving Boards Gym Mats—Foot Baths and Hypochlorite for Athlete's Foot Chain Link Tennis Nets

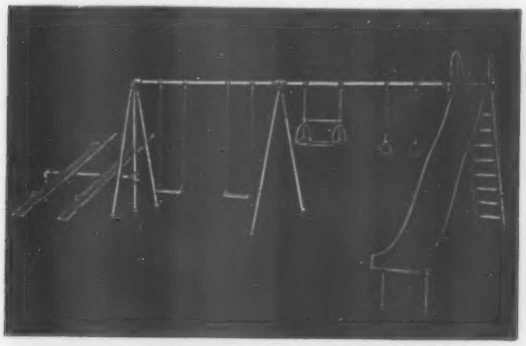
PRODUCTS

American Playground Equipment is Approved and Specified by leading School Authorities—the American line includes everything for playgrounds—Swings, Slides, See-Saws, Castle Towers, Wave Strides, Ocean Waves, Combination Units, Merry-Go-Rounds, Giant Strides and a hundred other proven items.

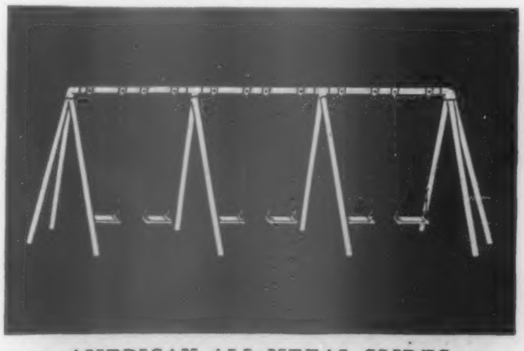
CATALOGUES AND LITERATURE

Complete literature and prices gladly sent on request. Each product is backed by our nation-wide reputation for Integrity and Dependability—We make prompt shipments, no long waits or delays.

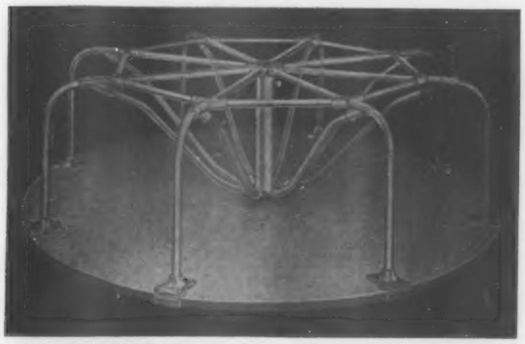
AMERICAN COMBINATION UNITS



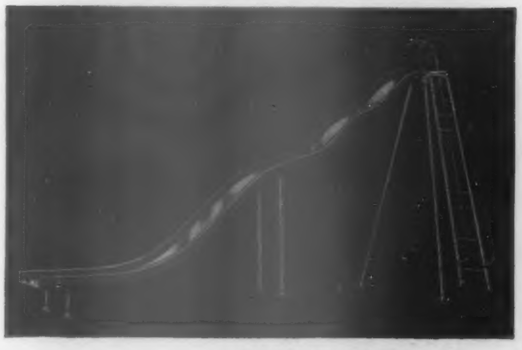
AMERICAN SWING SETS



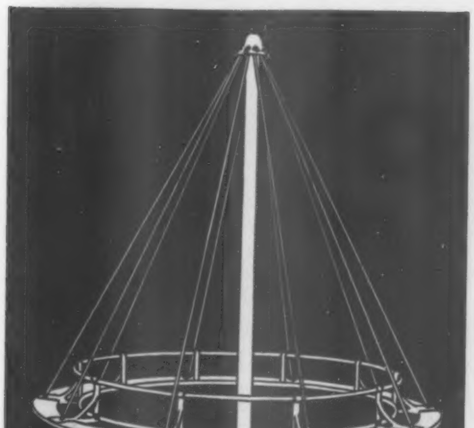
M-4 MERRY-GO-ROUND



AMERICAN ALL-METAL SLIDES



OCEAN WAVE

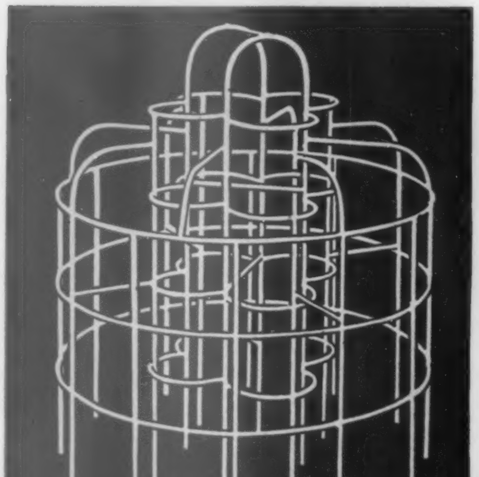


AMERICAN EQUIPMENT IS APPROVED AND SPECIFIED BY SCHOOL AUTHORITIES FROM COAST TO COAST

Each American product is guaranteed and backed by our 25-year reputation of Integrity and Responsibility. Our complete line is thoroughly tested and proven. Send today for our complete literature and prices on items shown on this page or opposite page —please mention item in which you are especially interested.

★ ★ ★ ★ ★

CASTLE TOWER



THE EVERWEAR MANUFACTURING COMPANY

Springfield, Ohio

EverWear
Stands Wear and Tear

32 YEARS
EXCLUSIVELY DEVOTED TO THE DEVELOPMENT AND MANUFACTURE OF RECREATION APPARATUS

Let Them Play
The EverWear Way

Catalog 32: EverWear Playground Apparatus

1. Safety Swing Seats—that actually prevent accidents.
2. Swings of All Kinds—Hangers—Suspensions.
3. Horizontal Ladders.
4. Log Swings.
5. See-Saws.
6. Bicycle Racks.
7. Kindergarten Outfits.
8. Slides of All Types and Sizes.
9. Climbing Outfits.
10. Merry-Wave-Strides.
11. Giant Strides.
12. Merry-Whirl.
13. Whirling Climb.
14. Ocean Waves.
15. Merry-Go-Rounds.
16. Traveling Rings.
17. Settees.
18. Horizontal Bars, Horses, Bucks, Parallel Bars, Jump and Vaulting Standards.
19. Volley, Badminton, Tennis Posts.
20. Volley, Badminton, Tennis Nets.
21. Basket Ball Backstops of All Types.
22. Flag Staffs.
23. Combination Outfits of All Types and Sizes.
24. Parts, Fittings, Units, Etc.

Catalog 32-W: EverWear Swimming Pool Equipment

1. Resisbrek Laminated Spring Boards.
2. Diving Outfits.
3. Diving Towers.
4. Landing Ladders.
5. Life Guard Chairs
6. Beach Umbrellas.
7. Rubber Foot Trays.
8. Antiseptic.
9. Cork Life Rings.
10. Cork Floats.
11. Life Lines.
12. Cocoa Matting.
13. Safety Swing Diving Outfits.
14. Water Slides of All Types and Sizes.

Catalog 31-B: EverWear Basket Ball Backstops

1. Fan-Shaped Bank Boards.
2. Rectangular Bank Boards.
3. Goals—Nets.
4. Forward Fold Backstops.
5. Backward Fold Backstops.
6. Coliseum and Field House Portable Backstops.
7. Unit Swing-Up Backstops.
8. Fixed Extended Backstops.
9. Gymnasium Mats.
10. Parts, Fittings, Units, Etc.

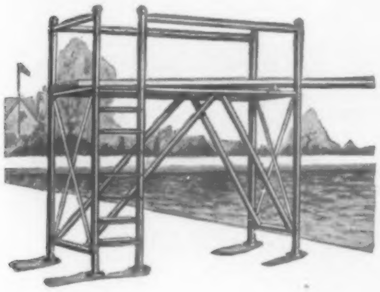
MITCHELL MANUFACTURING CO.

Milwaukee, Wisconsin

Playground Apparatus
Beach and Pool Equipment
Fold-O-Leg Tables

"Betterbilt"

Folding Choral Stands
Folding Band Stands
Sanitary Barn Equipment



FOR THE SWIMMING POOL

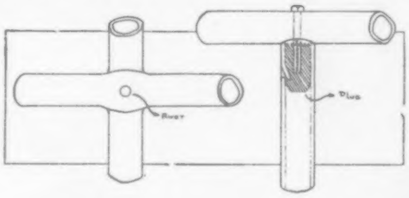
DIVING BOARDS
WATER SLIDES
LADDERS
TOWERS
STANDS, Etc.

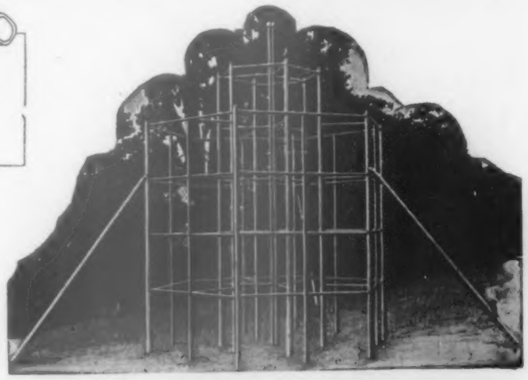
Mitchell Laminated Diving Boards are specially treated and guaranteed. Eliminate seasonal experimentation by trying just one of these boards. Write today for Booklet No. 2.

Safety THE IMPORTANT FEATURE OF ALL MITCHELL "BETTERBILT" APPARATUS

SAFETY FITTINGS

Special Design eliminates exposed bolt ends and nuts on Mitchell Climbing Gyms and Pool Equipment. Extra-rigid, strong, foolproof corners and joints cannot possibly injure children or tear clothing.





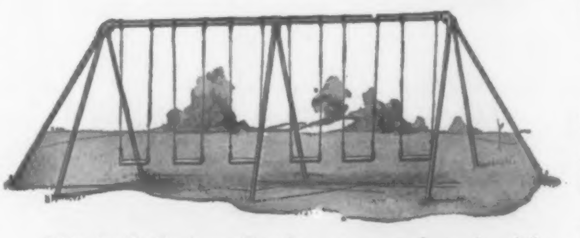
SOLID STEPS, HEAVY GUARD RAIL

Steps on all slides are made of heavy malleable iron, perforated for safety. Guard rails correctly designed and well braced.

MITCHELL ALL STEEL SLIDES ARE SAFE AND ECONOMICAL

CLIMBING IS INSTINCTIVE FOR MOST CHILDREN

Every playground device in the complete "Betterbilt" line reflects the many years of study devoted to the physical welfare and wholesome amusement of boys and girls — Tomorrow's Citizens. Write today for Booklet No. 1.



Mitchell Swing Hanger

Mitchell Swing Outfits are equipped with hangers which have extra bearing surface—increasing life of chain and hooks. Heavy malleable iron of extra tensile strength.

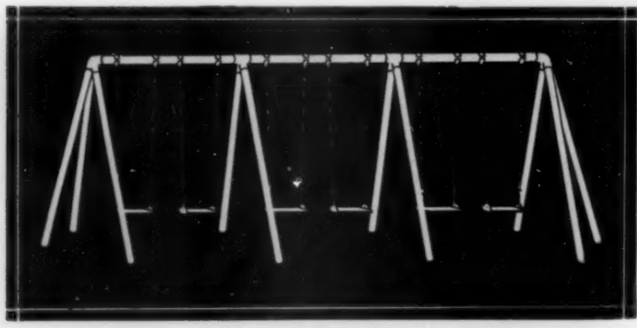
BOOKLETS
(Illustrated)

1. "Betterbilt" Playground Apparatus
2. "Betterbilt" Pool Equipment
3. Mitchell Fold-O-Leg Tables—see page 461
4. Mitchell Folding Choral Stands —see page 461
5. Mitchell Folding Band Stands—see page 461
6. Mitchell Sanitary Barn Equipment

RECREATION EQUIPMENT CO.

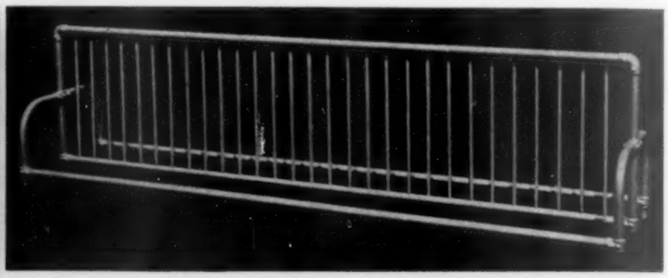
Manufacturers of Play Equipment for Playgrounds, Parks, Pools and Beaches

724-26 West Eighth Street, Anderson, Indiana



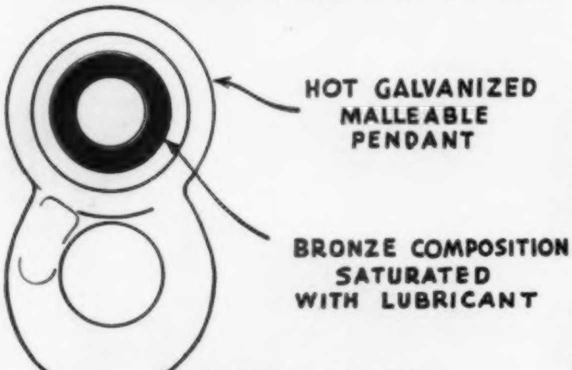
SWING SETS

Sets of different heights and lengths of frames.



BICYCLE RACKS

Several different types and sizes, hot galvanized steel and malleable throughout. Either duplex or single side design.



OILLESS BEARINGS

Above is shown details of famous RECREATION Oilless Bearings. These positively need no lubrication and will last indefinitely.

FOR THE PLAYGROUND

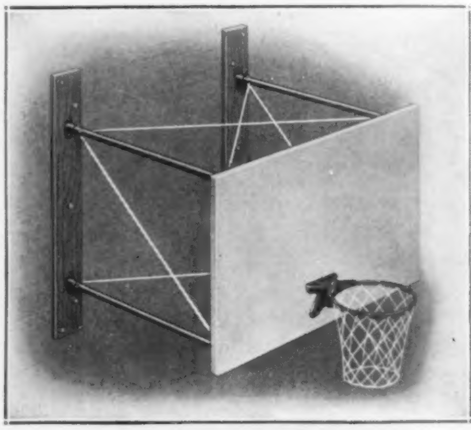
Swings, Slides, Merry - go - rounds, Monkey Jungles, Gym Combinations, See-Saw Sets, Ocean Waves, All - Metal Tennis Net Outfits, Park Settees, etc.

FOR THE BEACH AND POOL

Diving Board Outfits, Pool Ladders, Slides, Life Guard Chairs, Pool Cleaning Equipment, Diving Mask Outfit, Foot Bath Trays, Cocoa Matting, etc.

FOR THE GYMNASIUM

Basketball Frames of Wall, Swing-Up and Portable Types complete. Backboards, either Plywood, All-Metal or Glass, and either the standardized 4' x 6' or the newer fan-shaped. Official and regulation goals.

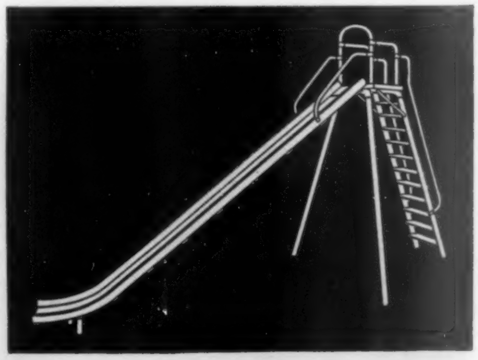


BASKETBALL BACKSTOP

This is only one of many types of frames.

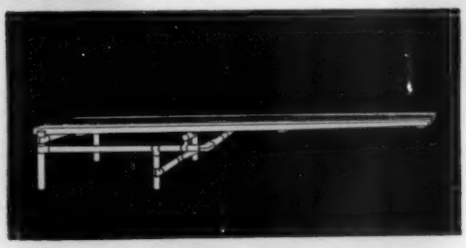
TRAMPOLINE

Here is shown our new tumbling device, which has proven so very popular. It furnishes plenty of exercise and a lot of fun. Adapted to gymnasium class work and for exhibition.



SLIDES

A great variety of slides are offered, both as to size and nature of construction. Our all-metal slides, furnished with stainless steel bedway, are practically indestructible.



Diving Board Outfits in great variety.
Write for free catalog.
RECREATION EQUIPMENT CO., Anderson, Indiana.

THE RECREATION LINE

THE RECREATION LINE

WALLACE & TIERNAN COMPANY, INC.

Manufacturers of Chlorine and Ammonia Control Apparatus

Main Office and Factory: Newark, New Jersey

"SWIM IN DRINKING WATER"

REPRESENTED IN

Atlanta	Chicago	Detroit	Kansas City	Minneapolis	Roanoke
Boston	Cleveland	Greensboro	Knoxville	Oklahoma City	San Francisco
Bridgeport	Columbus	Houston	Lexington	Omaha	Seattle
Buffalo	Dallas	Indianapolis	Los Angeles	Philadelphia	St. Louis
Charlotte	Denver	Jacksonville	Madison	Pittsburgh	Syracuse
					Washington, D. C.

Wallace & Tiernan, Ltd., Toronto, Canada
Wallace & Tiernon, Ltd., Winnipeg, Canada
Wallace & Tiernan, Ltd., Montreal, Canada
Wallace & Tiernan, Ltd., London, England

CHLORINATION

Since the school swimming pool has become a major factor in the physical training program, the importance of efficient sterilization increases. A report of the Joint Committee of the American Public Health Association and the Conference of State Sanitary Engineers contains excellent advice to school executives. In part, this report states: "From all available information, the addition of chlorine either as a gas or water solution by use of proper apparatus is today the most satisfactory method of pool disinfection." Only chlorine gives a penetrating sterilization, protecting bathers at every pont in the pool. Today more than 4000 pools in the United States rely on W&T Chlorinators.

W&T TYPE MSE CHLORINATOR

W&T Type MSE Chlorinator for the Sterilization of Average Sized Swimming Pools

Chlorine requirements for the majority of indoor pools and the smaller outdoor pools are less than 12 pounds per day. With a range of feed rates to include all changes in bathing load and recirculation rate, this chlorinator is ideal in this application. It is accurate and reliable and can be safely entrusted to non-technical help.

W&T TYPE MSV CHLORINATOR

Fills the need for larger pools and heavier bathing loads. It is an efficient sterilizer with ample capacity, simple to operate and of sturdy construction. More than 7000 chlorinators of this type have been placed in service and a survey of repair costs reveals the average annual maintenance cost is less than one per cent. In eighteen years no W&T Chlorinator of this type has ever worn out.

W&T AMMONIATOR

W&T Ammoniator Used with a W&T Chlorinator to Produce Chloramine

By combining chlorine and ammonia for water treatment chloramine is formed and a more lasting sterilizing action obtains. Though somewhat slower, this effective treatment insures persistent sterilizing action to overcome sudden increases in bathing loads. W&T Ammoniators conform to the same high standards of precision workmanship and materials found in W&T Chlorinators. They are designed to provide the added advantages of chlorine-ammonia treatment when used in conjunction with W&T Chlorinators.

W&T CHLORINE COMPARATOR

Accurate control of chlorination in pools requires a periodic series of checks by means of the ortho-tolidin test. The W&T Hellige Chlorine Comparator, using ortho-tolidin, provides a sturdy, accurate, simple means of testing. Only a moment's time is required to determine residual chlorine and no special technical knowledge is necessary.

AT YOUR SERVICE

W&T maintains a nationwide sales and service organization of skilled experts in water purification. They are prepared to offer recommendations on any problem of swimming pool sterilization.

Current literature, available on request, gives information on swimming pool sanitation and W&T equipment.

THE MATHIESON ALKALI WORKS (INC.)

60 East 42nd Street, New York, N. Y.

PLANTS

Niagara Falls, N. Y., Saltville, Va., and Lake Charles, La.

BRANCH OFFICES

Charlotte, N. C., Liberty Life Building
Cincinnati, Ohio, Dixie Terminal Building
Philadelphia, Pa., Widener Building
Chicago, Ill., 410 North Michigan Avenue
Houston, Tex., Second National Bank Building
Providence, R. I., Hospital Trust Building
Washington, D. C., 1625 Eckington Place, N.E.

PRODUCTS

Sanitation H T H (Concentrated hypochlorite)
H T H-15 (Germicide)
Lo-Bax
Liquid Chlorine
Anhydrous Ammonia
Aqua Ammonia—26°
PH-Plus (Fused alkali)
MaFoS (Dishwashing cleanser)

SANITATION H T H

For a wide variety of sanitary purposes, particularly around the swimming pool, locker room and gymnasium, H T H is a most convenient and reliable source of available chlorine. Concentrated, H T H contains over 70% available chlorine. Moreover, it retains this high strength in warm weather and during long periods of storage.

H T H is a dry, free-flowing granular product, readily soluble in water. It is packed in cases of nine 5-lb. cans.

For Swimming Pools

At thousands of swimming pools throughout the country, H T H is used to chlorinate pool water, for general disinfection of surroundings and for prevention of Athlete's Foot. A normal chlorine residual maintained with H T H, moreover, effectively inhibits algae growth. A sanitation routine which provides germicidal and fungicidal protection in and around the pool is easy and economical to follow with this concentrated hypochlorite. (Write us for complete directions.)

For pool water purification, H T H can be added direct to the pool in solution, or fed continuously with simple, inexpensive equipment. At many pools where liquid chlorine is used for regular chlorination, a supply of H T H is kept on hand for emergency use in case of a breakdown of pumps or chlorinating equipment, or an interruption in the power supply.

To Prevent Athlete's Foot

Locker rooms, shower rooms, toilets, pool runways, etc., are undoubtedly among the worst offenders in the spread of Athlete's Foot.

Health authorities agree that the best preventive is a careful sanitary routine which includes the use of hypochlorite solutions such as those made from H T H and Lo-Bax, both in footbaths and for general disinfection of surfaces which may transmit infection. Write us about The Mathieson All-Rubber Footbath especially designed to economically and efficiently combat Athlete's Foot.

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School laundries, like commercial laundries, find that H T H solutions are uniform and economical for bleaching and sterilizing linens, towels, uniforms and other white goods, and as a sterilizing rinse for cotton bathing suits. H T H enables them to avoid the danger of over-bleaching, which shortens the life of fabrics, and the alternate danger of inadequate protection.

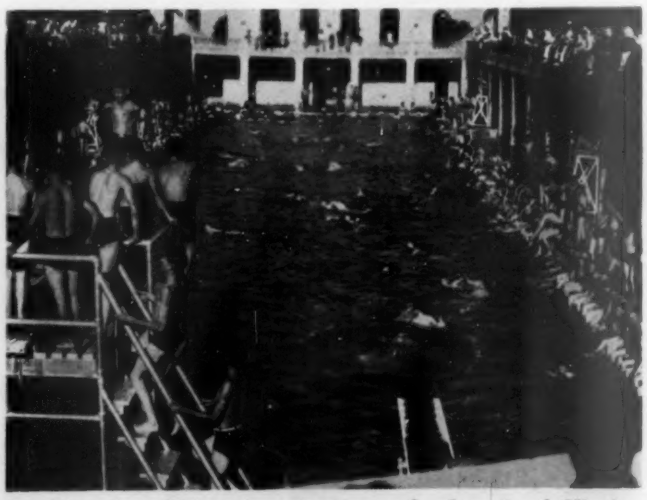
OTHER MATHIESON PRODUCTS

H T H-15—An all-purpose germicide and deodorant which is ideal for use in school kitchens, dormitories, camps, etc. H T H-15 contains 15% available chlorine and is simply added direct to water by the spoonful.

Lo-Bax—A convenient chlorine carrier packed in 1¾-lb. bottles and containing 50% available chlorine. For preparing footbath solutions and for use around shower and locker rooms where limited quantities of hypochlorite are required.

PH-Plus—A fused alkali manufactured especially for restoring to swimming pool water the natural alkalinity it loses in use and during filtration. Makes pool water "feel fine."

MaFoS—A new type of cleanser for dishwashing machines which comes in the form of dense, water-free briquets. Tests prove it more efficient and economical than powdered cleansers.



Louisiana State University swimming pool, where Coach Higginbotham uses H T H to clean, chlorinate and control algae

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ESTABLISHED 1850

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YOU CAN KEEP mosaic, ceramic, or vitrified tile looking like new by cleaning your pool with Tilite. A twofold chemical-mechanical cleaning action makes it easy, for Tilite goes to work on imbedded dirt as well as surface dirt—saving time and labor.

Stains of nearly every kind vanish quickly, even rust stains. Yet Tilite is entirely safe as it attacks neither tile nor grouting. It protects the big investment you have in a pool. Contains no soap to make wet surfaces dangerously slippery. Economical to use. Packed in 50, 150, and 300 lb. drums.

Perchloron takes care of pool sanitation after Tilite has made it sparkling clean. Use it on the walls and for chlorination of the water. Containing more than 70% available chlorine, Perchloron is a strong sanitizing agent, and it also helps to control slime and Algae growths.

It combats and controls athlete's foot when placed in shallow trays through which swimmers must step. Many pools use it for disinfecting locker rooms and washrooms. It is a dustless, free-flowing, granular material that keeps well and holds its strength. Dissolves readily in water. Packed in handy cans with airtight replaceable covers, 9 cans to the case.

Write for free samples of Tilite and Perchloron.

Perchloron

TILITE

SECTION VII
CLASSROOM—LIBRARY—AUDITORIUM

MODERN ELEMENTARY CLASSROOM DESIGN

By SCHOOL PLANNING ASSOCIATES-ARCHITECTS *

Elizabeth, N. J.

ANY research into the field of classroom design brings an architect face to face with the purely pedagogical controversy of "traditional teaching methods" versus "activity program."

Putting aside educational methodology for the moment, there are, however, underlying precepts against which any classroom must be measured before it can be called adequate from either point of view. Our concern for the moment will be to set forth, generally, certain basic criteria governing any approach to adequate classroom design, and by means of the illustrations to show how these principles have been incorporated into the design of various types of classrooms.

The word "classroom" is so much wrapped up with our recollections of the past that before we can think of it in terms of present-day standards a new word may have to be adopted; "workroom" is suggested by N. L. Englehardt, Jr., † as more truly indicating its function. No longer is a classroom considered adequate which consists of four walls with blackboards and fixed seats. The modern classroom is a place where children experience what they are learning—through projects and group study. This new concept calls into practice new equipment, new space requirements, and, above all, a new environment, designed to meet these new conditions. A classroom compressed into a preconceived architectural envelope can definitely hamper and limit the scope of the educational curriculum.

The far-reaching effect of the classroom design upon the child can best be appreciated by the architect who has watched children work and grow in the enthusiastic, self-educating atmosphere of an adequately planned room as contrasted with the frustrating effect on the growing child of the old-fashioned circumscribed, unadaptable classroom. It is surely not enough that a classroom must provide adequate light, ventilation, and safety as well as all the other fundamental requirements provided for in most state educational laws; nor is it enough that children are merely provided with desks and seats.

A classroom must be considered as a background against which children must spend a great deal of their formative years, and its design should show the architect's deep appreciation of this fact. The educational philosophy of the school system should play an important part in the design of a classroom, and the Board of Education's statement of need should clearly indicate to the architect the intended use and type of program to be carried on.

The treatment of a classroom, then, should be such that children will learn to live and work together in an atmosphere that is at once stimulating and yet serene, without that drab dullness and standardization that characterized so much of our earlier schoolbuilding design. What criteria, then, must govern the architect and educator in planning a modern classroom?

Flexibility

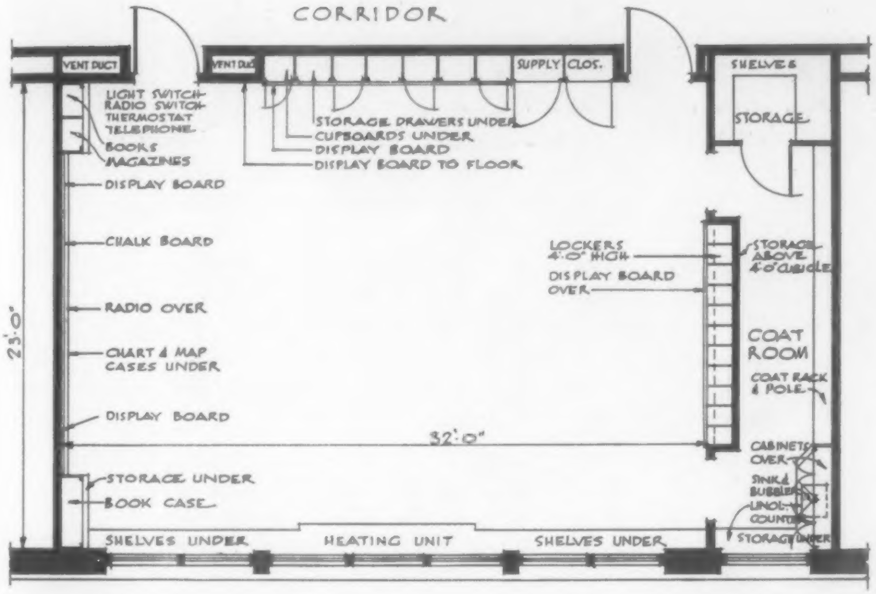
New concepts in the field of educational philosophy, and constant changes in the make-up of the curriculum, would point to flexibility as perhaps the most important single element in modern classroom design. It is generally accepted that fixed furniture and seating arrangements are no longer desirable, but the mere fact that the chairs and desks are movable does not in itself indicate that a classroom is modern.

With the growing trend to community use of the school building, the design of a classroom has to be extended to encompass the ever-increasing adult education field with its vastly divergent needs. This means that perhaps two entirely unrelated types of activity will have to be recognized and planned for in a single classroom.

A classroom which meets today's needs and yet is so constructed that the moving of a partition here

* Architect members of School Planning Associates: John W. McLeod, Harry Maslow, George H. Levy, Anthony Ferrara.

† *Architectural Record*—February, 1939.



CLASSROOM TYPE A

Plan

Plan of classroom based on traditional forms, showing complete use of wall spaces for cases, shelves, lockers, cupboards and drawers. Departure from the usual is the sink and counter arrangement in the coat room. A large storage closet and also supply closets have been provided. Note the large expanse of window area and full use of all space under windows

and the rearranging of cabinets there would make it equally satisfactory ten years hence, would go a long way toward a freedom of educational planning which is all too often impossible within the hard-and-fast limitations imposed by much present-day classroom construction.

A classroom should be so designed that modifications may be made within the room itself in order to adapt it to some new type of activity perhaps not yet conceived or developed.

Design and Decoration

Quite often, in planning school buildings, architects are inclined to overlook the significant part that the individual classroom plays in the wide field of education and to consider it merely as one item in the whole plan. The atmosphere created in a classroom has a deep effect not only on the pupils, but on the teacher as well. It is too often true that classrooms are poorly designed and uninterestingly decorated. In such surroundings it is difficult for the teacher to overcome the depressing and uninspiring environment thus created, with the result that the program is lacking in interest for the pupil.

Picture the contrast when both teacher and pupil are living education in pleasant and inspiring surroundings, wherein the human values have been recognized in both the designing and the equipping of the room. The skillful and studied use of color can contribute greatly to the creation of the desired atmosphere, and at the present time there can certainly be no excuse for the monotonous use of one color on all the walls of a school building. The reason surely cannot be one of economy, since it is well known that

CLASSROOM TYPE A

View Looking Toward Front

Showing the convenient and diverse storage areas with chart and map cases under front chalkboard; the magazine rack and bookcase in right-hand corner, and bookcase with glass doors on left-hand side; cubicles under entire window, and cupboards and drawers in corridor wall of classroom.

Display areas are located above and around blackboards, with supply-closet doors cork-faced to augment display areas. The use of glass-block panel will serve to furnish borrowed light to corridor.

Acoustical ceiling treatment for sound correction. Floor covering to be one of the many types of resilient flooring.

All the electrical controls, including the light switch, radio switch, thermostat and telephone, have been arranged in a single panel for ease of control and operation. The daylight control of windows in this room is by means of shades hung at the center of window, to be drawn up or down.

one color is no more expensive than another.

Our experience shows that considerable study must be made before colors can be selected with appropriateness. Orientation and shape of room, intensity of light, type of activity, as well as the psychological effect on children, are factors which should be taken into account for each individual room. Is it any wonder then that the easy way is to use one color throughout? A color in itself may be very interesting, but constant repetition soon makes it monotonous.

While on this subject, the use of wallpaper suggests itself. What could break up the sameness of classroom walls better than a variety of wallpaper designs? With the wider application of this type of decoration, the greater will be the range of pattern, with perhaps the designing of special wallpapers for classrooms. With the improved techniques in the manufacture of sun-fast and washable wallpapers, many previous objections to this type of wall covering have been removed.

The effect of the design of a classroom upon the children is of such importance that every item entering into its construction should be evaluated and, where necessary, re-designed to assist in the educational processes. Hardware, plumbing, and electrical fixtures are brought to mind in this respect.

Another often overlooked item in the search for more pleasant classrooms is the use of exhibits. Objects of art and interest, for which the architect has provided the proper setting, can go a long way toward stimulating in the pupil's mind a desire to create. The allotting of large areas on the walls of the classroom for displaying mural paintings and projects made by the children acts as a constant stimulant to the imagination. Classroom exhibits are often carried over into corridor display spaces, thus widening the sphere of interest.

Scale

One of the most important and least considered items of classroom design is child scale.

Respect for child scale should influence not only the classroom but the design of the entire school building. In this connection the one-story building is much more desirable than the awe-inspiring, multistoried, monumental type of structure. The single-story structure is in much better relation to the child size and is more apt to make the child feel at home and hence more enthusiastic in his responses.

Sinks, pictures, and cabinets, as well as blackboards, should be set at the proper height for each age group. Windows should always be low enough so that children may be able to look out.

Kindergartens generally receive a great deal of study. A majority of architects are conscious of the fact that furniture and equipment in this room have certain definite limitations as to height and size, and yet in designing classrooms for the primary and upper elementary groups no such sympathetic consideration is apparent.

It would seem, then, that the primary and upper elementary classroom should be the subject of further research. Perhaps the steps from kindergarten through primary and into the upper elementary groups should be more gradual. In other words, the livability of the kindergarten should be extended into the design of the entire elementary school classroom, thus producing an infinitely more pleasant and stimulating atmosphere than has been the case heretofore.

This objective can be reached only by the sympathetic collaboration of architect and educator, the skill of one supplementing the vision of the other.

Equipment and Storage

Modern teaching methods have made necessary a complete re-study of classroom equipment and storage.

The increasing study of plant and animal life as well as the performing of simple experiments in the

CLASSROOM TYPE B (opposite page)

Plan

Designed to house an activity program, this classroom follows the progressive trend by providing toilet rooms adjacent to the classroom.

Adequate facilities for storage have been planned, including a large storage room with shelves and cubicles, a filing cabinet for instructor, and cabinets in rear of room, bookcase and magazine rack at front of room, and shelves and cabinets under window shelf. The work-bench is also provided with drawers and cupboards. The work area in the rear of the room is made flexible in size by the use of movable cabinets; this area is provided with work-bench, sink and bubbler, and space for movable clay and tool trucks, which will facilitate program changes. Individual storage space is provided by lockers in corridor, a trend borrowed from the high schools.

This classroom is adaptable to a two-story structure. The first-story rooms may have doors opening to the exterior.

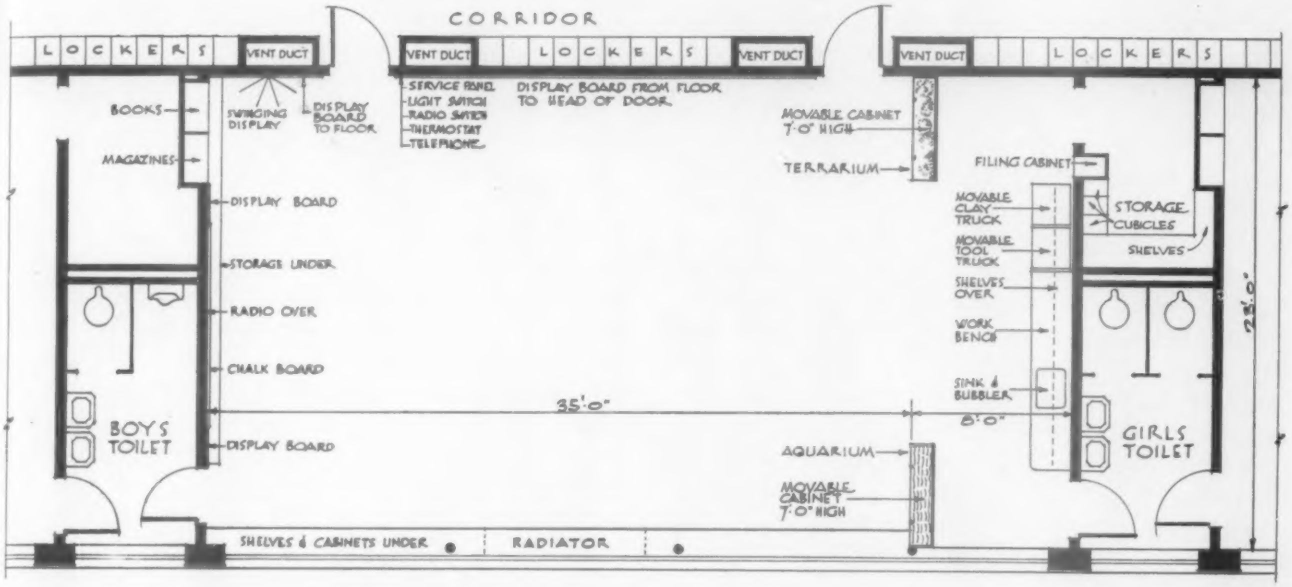
View Looking Toward Front

To obtain maximum display area, the walls are cork-covered from floor to doorhead height to provide ample working and display surface.

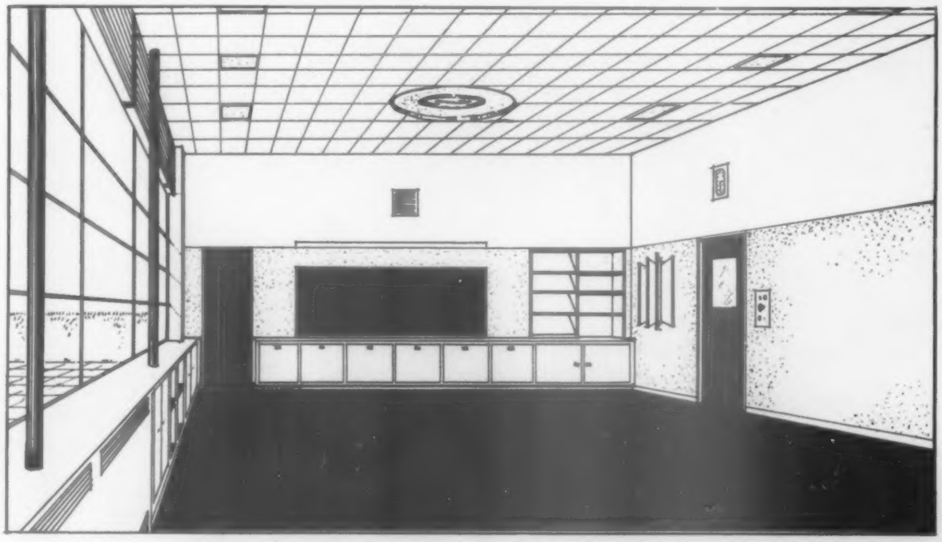
An additional display area is the swinging cork-board near the front entrance door. The doors are of the flush type, and the entrance doors are provided with glass panels. It will be noted that the map over the front chalkboard is incorporated into the design. The chalkboard shown has been held to a minimum, since there are no fixed seats in the room, as portable chalkboards will serve the several groups working in the room at one time. The maximum amount of window area has been planned, and window provided with wide stool for display of plants and objects of interest. Venetian blinds provide adequate control of daylight. Artificial lighting is provided by flush units and from concealed coffers surrounding the air-diffusing grilles in ceiling.

View Looking Toward Rear

This view shows the work area separated from the rest of the room by means of movable cabinets. The cabinets make for a flexible work area. Incorporated in these cabinets are an aquarium and a terrarium, together with shelves for books and other work material. At the rear of the room is the work-bench with all its storage compartments, and sink with drinking bubbler. The movable clay and tool trucks are indicated next to the work-bench. Shelves have been provided over the work-bench for all materials necessary in the various projects. It will be noted that the cork-lined walls extend around the walls of the work area.



Above—Plan



Right—View looking toward front

Left—View looking toward rear

classroom has created the need for a sink in each room. A drinking bubbler is often connected to this classroom sink.

Storage space, in the form of a storage closet or in built-in cabinets and shelves, or in both, must be taken into account from the very outset of planning. The personal right of the pupil should be carefully respected in designing storage areas; whether it be by individual lockers or open shelves, clothing and equipment storage should be convenient and within easy reach. The space below display boards and under windows should be utilized to the fullest extent by means of built-in cases, seats, or shelving. The storage needs of the modern teacher are vastly increased; and where proper facilities are not provided, a serious curtailment of the program may result. Furniture should be light in weight, easily stored; perhaps of the nesting type for quickly clearing the classroom area. As the popularity of the outdoor classroom increases, the need for readily moved furniture increases, and provisions for adequate storage of outdoor equipment can no longer be ignored.

The use of movable equipment and tool trucks is in many cases obviating the need for special rooms and making possible the carrying-on of activity programs and project work within the single classroom unit.

Forward-looking architects are earnestly striving to make every possible inch of classroom space of use for either educational or storage purposes.

Play Spaces

While the outdoor classroom has been popular for many years in Europe, even in the northern countries, whose climate is no less rigorous than that of our northeastern states, it is just beginning to gain favor in this country. California is perhaps the most progressive in this respect, and outdoor classrooms have been in use there for a number of years.

Not only does the use of outdoor space enable the child to obtain the benefits of fresh air and sunshine, but it opens up a whole new field of study. Children are able to study plant and animal life in their natural habitats and are able to develop skills and knowledge far beyond that which can be obtained in the classroom. Soil conservation, erosion, and horticulture can all become vital parts of learning when the classroom takes itself outdoors. Animals, fish, and the proper housing of them, are problems which can be dramatized to the fullest extent when the children take part in the building of pools, cages, and runs.

It may not always be possible to obtain such extensive facilities as those mentioned above, but it is almost always possible to plan a building in such a way that each classroom has its own adjoining outdoor space—paved with one of the newer resilient paving materials, shaded with a tree or two, and, where possible, removed from the street.

The terrain of some school sites often allows for the erection of an outdoor stage.

Materials and Finishes

Contrary to former belief, it is becoming increasingly apparent that school buildings should not be constructed of too expensive and permanent materials. Monumental school buildings in use today clearly indicate the fallacy of planning buildings which, many years after their construction, create stumbling blocks to progressive educational practice by the very solid inflexibility that was their originator's chief source of pride.

The integration of outdoor and indoor classroom activities is making increasingly popular the one-story, flexibly constructed type of school building which can be readily altered to meet changing needs.

As further research is made into the field of dry-wall finishes, such as wallboards, plywood, etc., particularly in their relation to school buildings, the more these inexpensive materials with their interest-

CLASSROOM TYPE C (opposite page)

Plan

The design of the room is a definite departure as to both plan and structure. This plan was designed to allow as much freedom as possible within the room area, keeping all toilet and storage areas between the corridor and the classroom. This permits changes to be made in the classroom area without disturbing service facilities.

While this type of room is much more complete in many respects when compared with classrooms of the usual type, it is the firm conviction of the architects that the simplicity of the one-story structure combined with the use of some of the newer, inexpensive materials, in both structure and finish, would allow money usually spent on heavy inflexible construction to be used to provide more educational space and equipment.

Set apart from the room proper and opening directly onto it is an alcove raised one step above the floor, forming a locker alcove and stage with draw-curtains at sides.

The movable cabinet may be set against the rear wall when not in use and placed in any desirable location in order to subdivide the classroom area. To satisfy all storage requirements, ample space is provided for all teachers' and pupils' needs. Accessibility to the exterior for outdoor activities is integrated with the window treatment which extends across most of the exterior wall.

View Toward Corridor

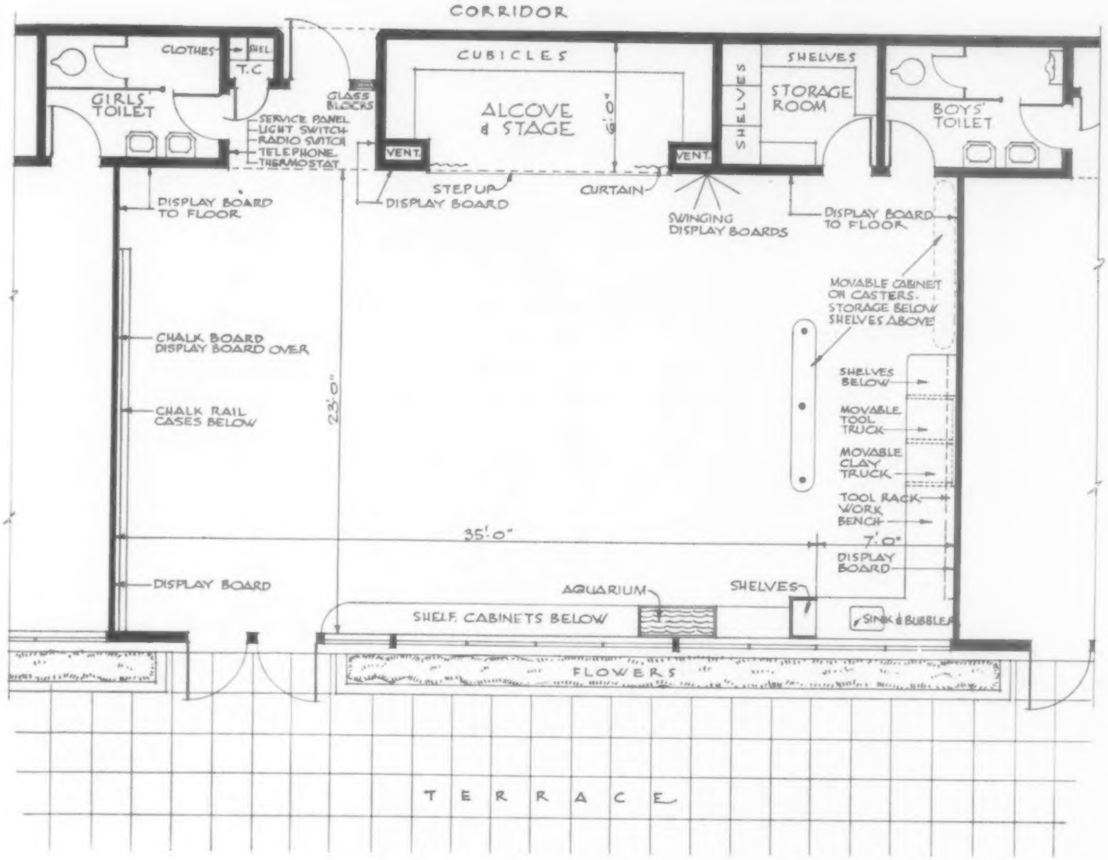
Note that the dark zone of the classroom has been eliminated by the use of windows at the ceiling on the corridor side of the room. This will provide natural light in this area. This view indicates the large spaces usable for display on all available walls. The relationship of the alcove to the room indicates its practicability for use as a stage to enlarge the scope of the classroom activities.

View Looking Toward Rear

This illustration serves to show the wide expanse of window lighting for the room and the clerestory lighting of the inner wall of classroom; the service rooms and alcoves are lighted by a similar arrangement. The corridor is lighted through glass-block panels. Venetian blinds or fixed horizontal louvers could be used for daylight control of the large window areas and the clerestory windows.

The sawtooth arrangement of roof, which might present a snow problem in certain parts of the country, is overcome by providing heating coils in the roof construction.

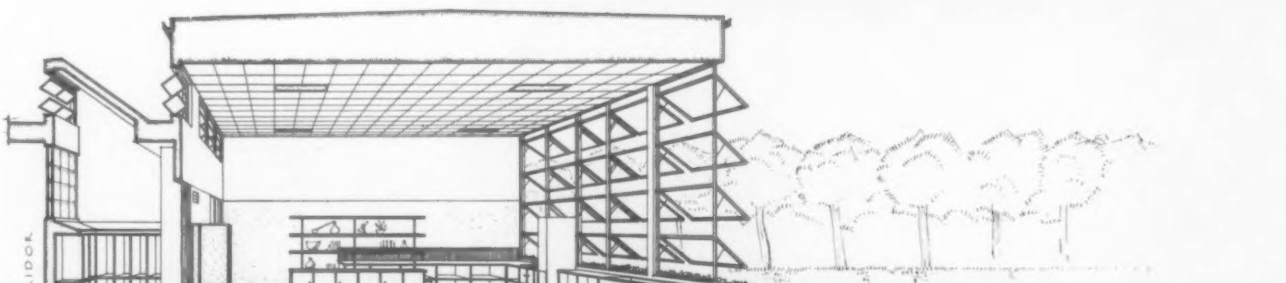
The transition from the classroom to the exterior is assisted by a flower-box along the entire length of the window. The terrace would be paved with a resilient paving material of pleasing color and design.



Left—Plan

Below—View toward corridor

Below—Sectional view looking toward rear, showing bilateral lighting of classroom and clerestory lighting of alcoves and toilet rooms



ing finishes, textures, and color will be used in the modern classroom.

Resilient flooring materials are increasing in popularity both from a sound-deadening point of view and because of the interesting floor treatment that may be obtained, thus allowing the architect to use still another medium in stimulating pupil interest.

With the use of tools and equipment in the modern classroom, it is almost imperative that some acoustical ceiling treatment be used. This may be in the form of acoustical tile or plaster. The study of acoustics has made great strides in recent years, and the amount of acoustical treatment required is worked out by means of a very exact science.

The benefits of using deadening felt under floors and behind chalk-boards should not be overlooked in this respect.

Lighting

Now that informal seating arrangements are becoming more widely used, it may well be that bilateral lighting will be adopted, particularly in the one-story school building.

Transoms high up on the corridor side of the classrooms are being used with a great deal of success, eliminating a dark zone which is always present when unilateral lighting is used. Obviously, this clerestory type of lighting can be used only where the building is one story in height; another reason for the increasing advocacy of this type of school building.

The use of individual windows with wide masonry mullions and deep reveals has resulted in very poorly lighted classrooms. An architect should be the first to realize that no architectural design is so all-important that the classroom lighting, with its resultant effect on pupils' eyesight, should be sacrificed. Windows arranged in a continuous row with a minimum use of mullions more truly express the interior functions of a school building, which is what, after all, constitutes good architecture.

Needless to say, glare must be avoided if satisfactory natural lighting is to be achieved. This can be overcome in a number of ways—by means of awnings, venetian blinds, shades; or, in very bright climates, louvers may be used. It should be borne in mind, however, that the control of window light must never be so complete that a child is prevented from exercising his eye-muscles by gazing out of the windows into the distance.

Artificial lighting in the classroom is a subject that is receiving continuing study and research from educators and architects, as well as various authoritative bodies specializing in the subject.

The choice between direct and indirect lighting will not be made here, but it will suffice to note that adequate lighting for a classroom is of prime importance. Perhaps the lighting of the room from a concealed source would solve the problem of glare caused by suspended concentrated light sources.

Sanitation

Toilet facilities in the form of small lavatories directly connected to the classroom are in some cases replacing the usual widely separated battery of toilets.

While it is obviously more costly to install the individual toilet arrangements, educators are high in their praise of the educational value of conveniently located facilities. In most cases these classroom toilets are arranged to serve two adjoining classrooms.

The sink and bubbler arrangement is almost standard practice in modern classrooms, particularly where an activity program is in force.

Conclusion

The functions of the architect and the educator in the building of a school are so closely interrelated that it is well to bear in mind that, while the burden is imposed upon the architect to design a building that will assist the educational processes at every turn, the educator has the better opportunity of judging the results.

This is particularly true where any features of the building are of an experimental nature, and it behooves the educator seriously to evaluate the worth of a particular innovation and to turn over to the architect his findings and recommendations for future undertakings along similar lines.

TWO THEATRES FOR AMERICAN COLLEGES

By EDWARD C. COLE

Assistant Professor and Technical Director, Yale University
Department of Drama; Technical Consultant to Theatre Architects

AMERICAN colleges and universities are increasingly recognizing the value of dramatic production on their campuses, both as a cultural influence upon the students and as training for professional activity.

Undergraduate dramatic organizations, many of them twenty or more years old, have long produced plays on improvised stages in lecture halls, in assembly halls, rented theatres, or town halls, have long rehearsed in social rooms and classrooms, and have long built scenery, costumes, and props in basements. Currently their persistence is being rewarded by the frequent induction of dramatic work into the curriculum, and the construction of new buildings expressly to house their activities. The pioneer work of the 47 Workshop at Harvard and of such departments of drama as those at Carnegie Institute of Technology and Yale University has spread until departments of drama, or of speech including drama, are the rule, rather than the exception, in large universities, and an undergraduate major in dramatics is possible at more than one so-called conservative eastern college.

Growth and Influence of Dramatic Production in Colleges

The construction of theatres at Amherst College and Williams College, both in Massachusetts, is exemplary. In both of these institutions, dramatics has been a strong extra-curricular activity for many years, and the theatres, workshops, and rehearsal rooms have been considerably less than adequate. Play production has now been acknowledged as educational and cultural, faculties have been increased to handle dramatic courses, and new theatres have been provided. These colleges are representative of a fairly large group of American institutions. Each has approximately a thousand students, a faculty of between fifty and a hundred, is located in a small town or city, remote from urban centers, and in an area from which legitimate theatre in the form of traveling- or stock-company has been absent for many years.

Dramatic production in such a college has a multiple function. It satisfies the natural urge to dramatic expression of some of the students. It presents in its proper form and place, a performance in a theatre, much of the world's best writing which is studied as literature in the classroom. It supplies one form of social activity for students, faculty, and townspeople. It gives the community the only available form of legitimate theatre. It furnishes the students with a lively cultural interest which possesses great possibilities of participation and enjoyment in the years after college.

Active work in play production, furthermore, affords practical training in several of the arts, crafts, and sciences, productive occupation of leisure hours, and experience in cooperative effort. It may even become the first step toward professional careers in the world of entertainment, theatre, motion pictures, radio, or television, for those young people who are enabled to discover and develop their talents.

Back of the proscenium, in the working areas and on the stage, the plans for the Kirby Memorial Theatre at Amherst and the Adams Memorial Theatre at Williams were influenced by the following factors: permanence of the organization; self-sufficiency; the nature of the actors and workers; the variety of the performances required.

Permanent Use as Theatres

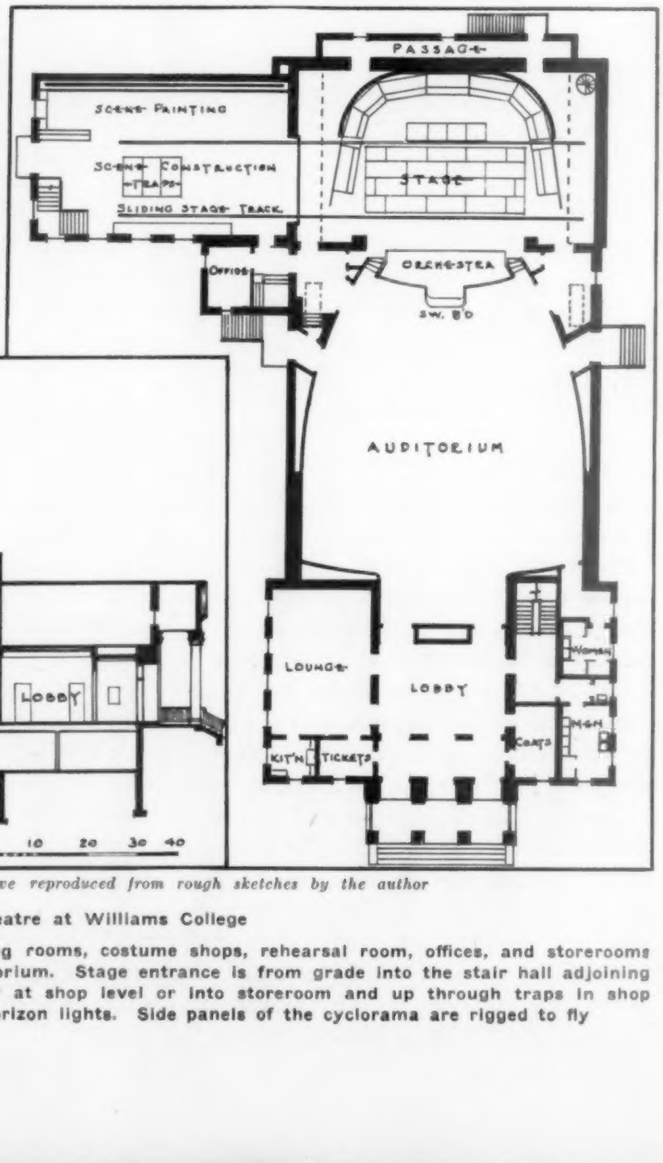
Significant about both the Kirby Memorial Theatre at Amherst and the Adams Memorial Theatre at Williams is the fact that they are primarily *theatres*. From front door to backwall they are planned for the production of plays, rather than for lectures, concerts, or college convocations. The lobbies are designed for free audience traffic before the play, during intermissions, and after the play. Lounges are planned for circulation and social "visiting." The auditoriums have floors which are sloped to afford clear vision of the stage from every seat, and the side seats are close enough to the center so that the entire acting portion of the stage may be seen from the most extreme positions. Seats are comfortably upholstered and amply spaced. Wall decoration is simple and directs audience attention to the center of interest—the stage. Wall and ceiling shapes are acoustically designed and contain slots for concealed lighting of the auditorium and stage. Projection booths are spacious and have flat projection angles.

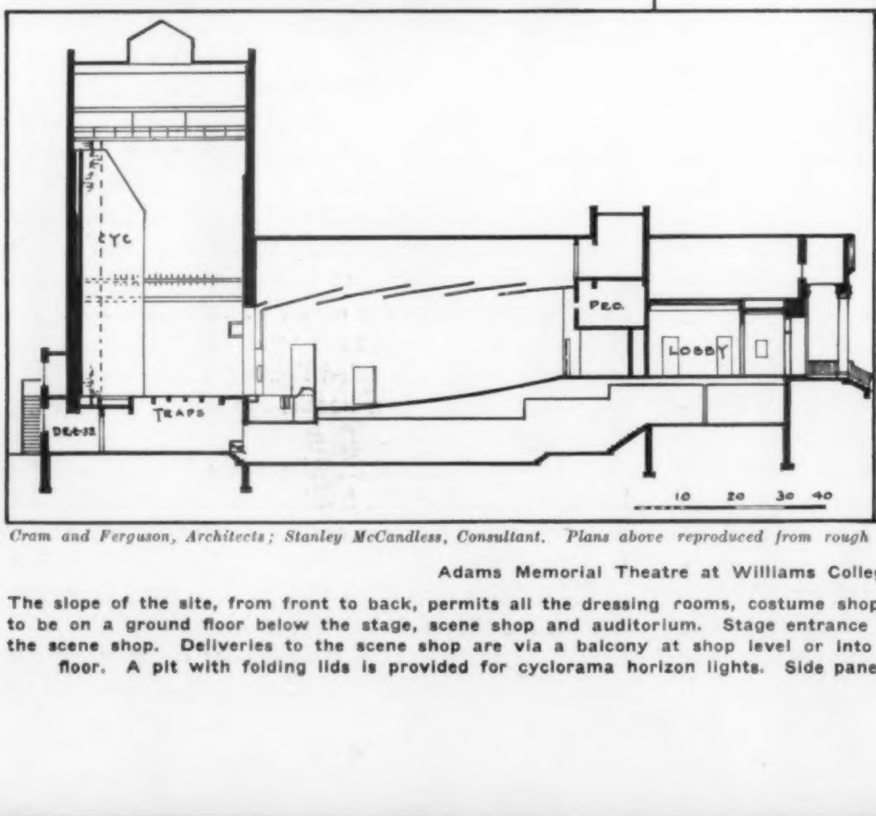
In the Kirby Theatre the stage lighting control board is located in the front of the theatre, adjoining the orchestra pit, where operators, concealed from the audience by an unobtrusive hood, have a clear view of the lighting effects which they are controlling, and can cue the effects directly from the action of the play. In the Adams Theatre, provision is being made for the later installation of a compact, portable control

board, employing vacuum tubes, which is now in the process of development. This control board will allow the electrician to sit in the auditorium during rehearsals, see the play as the audience sees it, and, with his portable control board literally in his lap, plan the lighting from that vantage point; then move into a pit similar to the one at Amherst for the performance.

Self-Sufficiency of the Organization

A college dramatic organization is to a large degree self-sufficient, partly of necessity and partly by choice. Limited budgets impose restrictions upon the amount of labor which may be paid, the number of costumes which may be rented, and the amount of ready-made scenery and properties which can be purchased and rented. These restrictions are fortunately counteracted by an amateur interest in dramatics which manifests itself in various ways. At Amherst, for instance, a committee of wives of faculty make most of the costumes. That theirs is not a passing interest is evidenced by the fact that they made the costumes for five big costume plays in quick succession: "High Tor," "Mary of Scotland," "Peer Gynt" (in two parts, each a full evening's performance), and "Fashion." To make the costumes for any one of these plays would occupy the complete personnel of a New York costume shop for two or three weeks. Ample shop space must be provided, therefore, for work on costumes, with cutting tables, sewing machines, dress forms, and ironers among the equipment. In the Kirby Theatre, group dressing rooms adjoining the costume shop afford extra work space when the shop becomes crowded. Group dressing rooms, furthermore, are preferable to individual accommodations, when, as at Amherst, one skilled make-up artist must supervise the make-ups of many actors. A more expansive theatre plan might include a make-up room separate from but adjacent to the dressing rooms.





Cram and Ferguson, Architects; Stanley McCandless, Consultant. Plans above reproduced from rough sketches by the author

Adams Memorial Theatre at Williams College

The slope of the site, from front to back, permits all the dressing rooms, costume shops, rehearsal room, offices, and storerooms to be on a ground floor below the stage, scene shop and auditorium. Stage entrance is from grade into the stair hall adjoining the scene shop. Deliveries to the scene shop are via a balcony at shop level or into storeroom and up through traps in shop floor. A pit with folding lids is provided for cyclorama horizon lights. Side panels of the cyclorama are rigged to fly

The condition of permanence, coupled with a reasonable desire for economy, leads to the inclusion of ample storage space for costumes, scenery, and properties. A single re-use of one costume or piece of scenery cuts in half the cost per show. Third or fourth usings of such items reduce appreciably the cost of production. Closet and attic space for costumes, a vault under the stage for properties, and the entire basement under the shop for scenery, are the storage facilities at Amherst. At Williams, storage is mainly under the auditorium and under the shop, and in about the same quantity. Storage spaces are arranged in the original plans on the basis of size, shape, and probable numbers of the items to be stored.

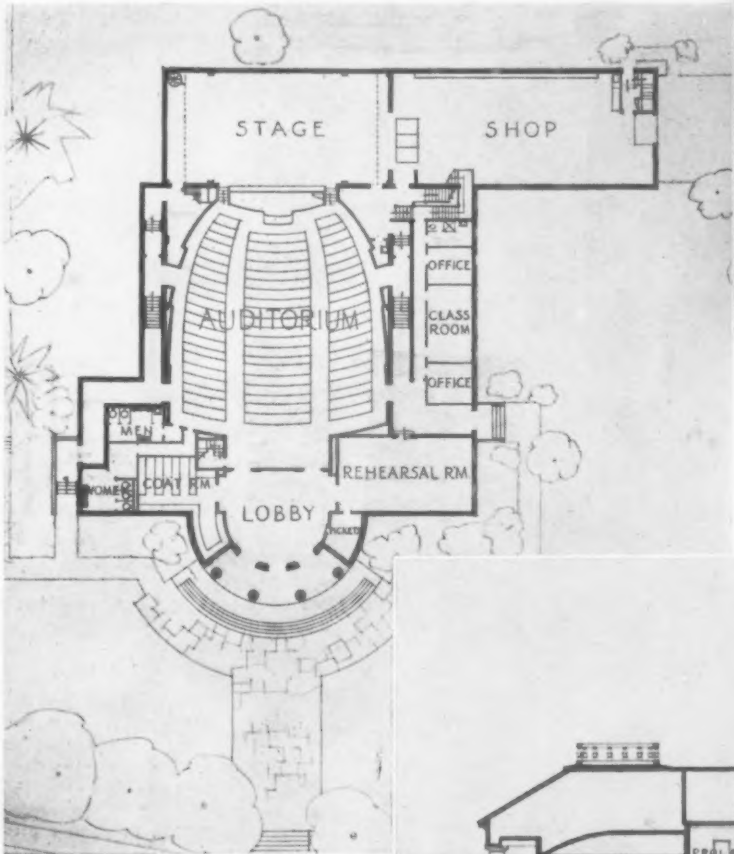
Actors and Workers

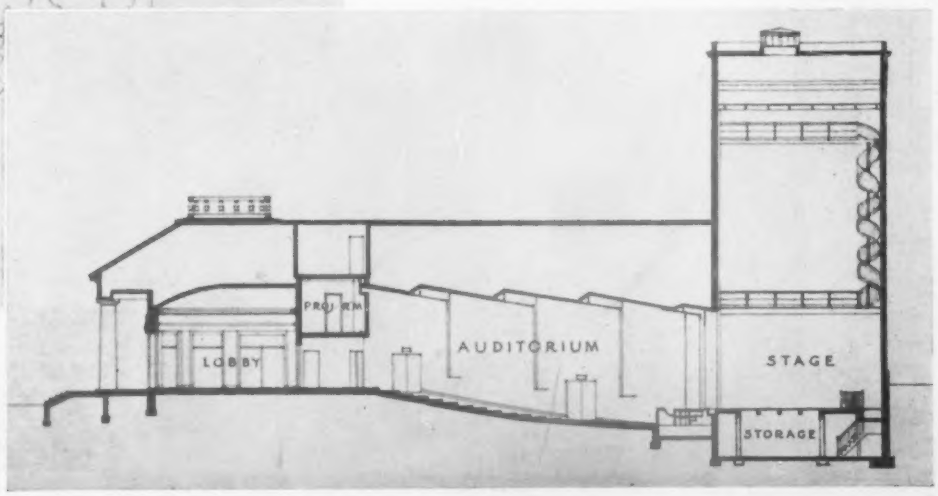
The amount and kind of labor available for undergraduate play production is a factor in planning the size, shape, and arrangement of the shops and stage. A small faculty in dramatics (at Amherst three, and at Williams two), a small group of students taking dramatic courses for credit, a larger group powerfully interested in dramatics as extra-curricular activity, and a still larger number of the student body with intermittent interest and willingness to help, form the whole working personnel. At Amherst we must consider the janitor, who takes great personal pride in the theatre and has had former experience as a structural rigger. Thorough professional knowledge and ability are possessed only by the faculty members; the rest of the personnel are willing and intelligent, but unskilled and subject to the numerous demands upon their time exercised by courses and other college activities. Student work is thus limited to a few hours each day, but not every day.

The scene shop is therefore planned to induce participation and stimulate students to the maximum of productive effort. The shape of the shop accommodates the sequence of operations involved in scene construction. Power machines are strategically located along that sequence; benches, shelves, and

Kirby Memorial Theatre at Amherst College

Storerooms are under the shop. Costume room and dressing rooms are over the shop. The permanent plaster cyclorama, stage traps, and tracks for sliding stages are not shown, but are essentially the same as in the Adams Memorial Theatre. The finished building omits the offices and corridor, and contains alterations of the cloak room wing to provide an office for the director





McKim, Mead, and White, Architects; Stanley McCandless, Consultant

supply cabinets are similarly arranged. The shop is large enough to permit simultaneous work by many students in necessarily short shifts. In each theatre a wide elevating paint frame facilitates scene painting, and glamorizes it somewhat.

Variety of Performances

Variety of production is a paramount consideration in a college theatre because of the cultural and educational aspects of the situation. Plays on historic topics, plays from the history of the theatre, and plays of past or present cultural or social significance, must be produced along with plays which may be described as pure entertainment. The theatre must be able to accommodate diverse production techniques and all kinds of scenery. For this reason these theatres are fitted with both the old-style rope system and the new-style counterweight-and-pipe system for hanging scenery, fly galleries on each side, steps from stage to auditorium (for such plays as "Waiting for Lefty"), and orchestra pits which may either hold an orchestra or be covered to furnish a fore-stage for Shakesperian productions. The Adams Theatre has, in addition, large openings in the auditorium sidewalls which may serve as small side stages, or as entrances onto a fore-stage, and are curtained when they are not in use.

The stages are big enough to give any production a professional scale; that is, the scale to which the same production would be produced in New York. It is noteworthy that production to too small a scale tinges any performance with "little-theatre" and invites a patronizing attitude in the audience. In both these colleges, the production groups aim at performances of professional caliber and invite criticism on that basis.

The stage equipment is designed to reduce the amount of work required to mount and operate a production. The aforementioned systems for hanging scenery, tracks for full-stage sliding wagons, and the large opening between the stage and shop, all serve this end. It is regrettable that, in both theatres, the wagon stages may move only in one direction; scene

Top—Amherst College presents "Peer Gynt," by Henrik Ibsen, on the stage of the Kirby Memorial Theatre

(Directed by Curtis Canfield; designed by Charles Rogers)

Left—In the Kirby Theatre the stage lighting control board is located in the front of the theatre, adjoining the orchestra pit

changes would be considerably facilitated if there were similar spaces opposite the shops into which they might move.

The importance of stage lighting in the creation of the total visual effect of a production, and the possibility of enhancing any production by the use of light, has caused emphasis on the facilities for the practice of this comparatively new art. The control boards have already been mentioned. The plaster cycloramas afford permanent, rigid sky backgrounds, with smooth, highly reflective surfaces upon which light may be played, for the creation of either the best natural exterior effects or a great variety of arbitrary or stylized decorative effects. Lights for the cycloramas are placed in pits sunk into the stage floor, which have folding lids, and on specially designed overhead rigging. Flying bridges, proscenium light slots, auditorium ceiling light slots, and light perches on each fly gallery, afford a wide selection of mounting positions for lighting instruments, allowing the designer to direct light at the stage from almost any angle.

While schematically the same, the two theatres have some points of difference which must be noted:

The auditorium of the Kirby Theatre at Amherst is lighted solely by indirect lighting from the ceiling coves. The Adams Theatre at Williams has two separate sets of auditorium lights: down lights through small holes in the ceiling to illuminate the audience; and cove lights to illuminate the walls and ceiling. The Adams Theatre has a stage-level passageway behind the cyclorama, whereas, at Amherst the only means of getting from side to side of the stage, when the cyclorama is being used, is by descending to the basement level. At Amherst the ceiling height of the shop is limited to 16 feet by the necessity of placing dressing rooms above, while at Williams the shop is open to the roof, allowing greater working height and a higher paint frame.

An Appraisal of Use Value

The proof of any set of plans is the use of the building for its intended purpose. While nothing can

Top—A scene from "High Tor," by Maxwell Anderson, as presented in Kirby Memorial Theatre

(Directed by Curtis Canfield; designed by Charles Rogers)

Right—The Kirby Theatre was planned for the production of plays, rather than for lectures, concerts, or college convocations

be said at this time regarding the Adams Memorial Theatre, because it is not yet in use, an appraisal can be made of the Kirby Memorial Theatre at Amherst, which has been in use for two seasons.* During this time, the Amherst Masquers have produced, among other plays, "High Tor," "What Price Glory?" and "Mary of Scotland," by Maxwell Anderson, "Peer Gynt," by Henrik Ibsen, in its entirety requiring two full evenings, and "Fashion," by Anna Cora Mowatt. The plaster cyc was effectively used in "High Tor" and "Peer Gynt," the sliding stages made possible instantaneous changes of scene in "Mary of Scotland" and "Peer Gynt," and the wing-and-border period scenery of "Fashion" fitted the stage as it would have an old "Opry House."

In a college of about 850 students and 75 faculty, each production of the Masquers draws an audience of between 1,100 and 1,200, necessitating four performances. It is estimated that half the student body sees each play, and almost the entire faculty. The rest of the audience is from the surrounding community and countryside, which contains many small towns and a number of private schools and other colleges. There are 300 season subscriptions. This audience is double that which used to attend performances in the old building.

Interest in dramatics among the students has waxed.

* The author is indebted to Professor Curtis Canfield, Director of the Kirby Memorial Theatre, and to Ralph C. McGoun, Jr., Technical Director of the Kirby Memorial Theatre, for information about dramatic activity at Amherst College, and for the use of pictures of productions by the Amherst Masquers.

One hundred, more or less, try out for acting each year, and about twenty indicate interest in production work. This is significant when it is pointed out that the candidates for the football team number between 60 and 70. Reward for continued meritorious work on productions, either on stage or behind the scenes, is election to membership in The Masquers, which has about twenty active members, all juniors and seniors.

A few other isolated facts are pertinent: Situated as Amherst is, among a group of colleges, there is some exchange of talent and audiences. Amherst has obtained actresses from both Smith and Mt. Holyoke, and has supplied actors for productions in both those women's colleges. Mt. Holyoke girls did much of the work on the Elizabethan costumes for "Mary of Scotland." A committee of faculty wives finds pleasant activity in the making of costumes. The Masquers have always balanced their budget, although they are finding that productions in the new theatre, because of their magnitude, have increased in cost about as the revenue from audiences has increased.

The Department of Dramatics has sole authority over the theatre building, with the understanding that its primary use is to be the preparation and production of plays.

—Edward C. Cole is the co-author, with Harold Burris-Meyer, of Stevens Institute of Technology, of "Scenery for the Theatre," the standard handbook on the organization, processes, materials, and techniques used to set the stage (Little, Brown and Co., 1938). They are currently preparing a book on the planning of theatres.

THE PLACEMENT OF THE SCHOOL AUDITORIUM

By STANTON LEGGETT

Secretary to President James Marshall, Board of Education of the City of New York

MODERN planning of the communication center for the speech, dramatic, music, and dance arts of the community school must be based upon the functions to which this space will be put by the school and community populations which it is being erected to serve. Placing the emphasis upon the uses of the communication center precludes uniformity and standardization of auditorium planning. There is no one auditorium design that will fit the needs of all communities. On the contrary, performer and spectator interests, always allowing for change and flexibility of program, vary widely from community to community, which, in turn, logically involves variations in requirements for auditorium spaces and arrangements.

Any discussion, therefore, of auditorium placement and, incidentally, auditorium design must merely provide a statement of possible elements. Choice of necessary elements, allocation of space emphasis, and the welding of such units into a harmonious, working whole, is the job of the local community operating jointly through its educators, the interested public, and its expert advisors, both architectural and educational.

The planning and design of the school auditorium have become increasingly complicated through the use of that space in a widening conception of its function and place in the school program. There has been realization of the strategic role of the auditorium in the development of a program centered on active participation by the people it serves in a democratically organized community, as a culture center for school and community, as a group meeting place for the discussion of common problems, and as a workshop for both community and school use in producing some form of creative, artistic performance—to cite only a few uses. The expansion of the function of the auditorium places new demands upon the physical space that will house and aid the programs that are to be inaugurated and carried on in the communication center of the school.

This article is concerned primarily with the placement, the location and accessibility, of the auditorium seating-space, stage, related and auxiliary areas. Only incidentally will aspects of design of these spaces be touched upon. Reference to the bibliography will provide suggestions for materials dealing with other aspects of auditorium planning. The data used as a basis for this study were derived from analysis of the plans of fifty school buildings erected in the United States in recent years, as well as a survey of the literature of the field.

FUNCTIONS OF THE AUDITORIUM WITH RESULTING IMPLICATIONS FOR PLACEMENT AND ACCESSIBILITY

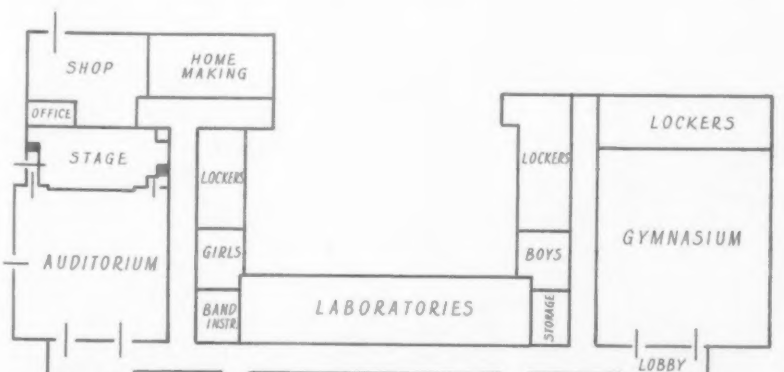
I. SAFETY—THE LOCATION AND ACCESSIBILITY OF THE AUDITORIUM SHOULD ASSURE THE SAFETY OF ITS OCCUPANTS.

Speed in emptying the auditorium is essential.

Ground Floor.—The auditorium should be located on the ground floor. The large numbers of people that will use the space, in connection with the need of prompt emptying of the auditorium, dictate this requirement. *Sufficient circulation space* and exits should be provided to allow the emptying of the auditorium in two minutes.

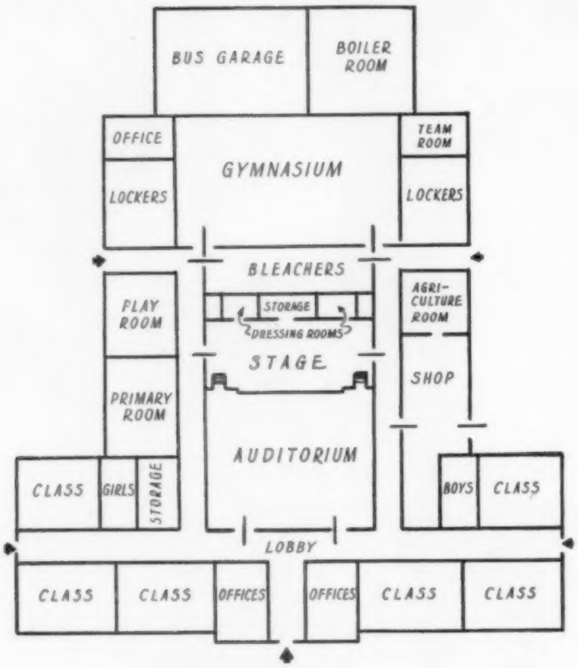
Direct access to the outside is necessary.—Bottleneck conditions should be avoided. Straight travel lines, with increasing widths, should lead up the aisles, through the lobby, to the outside. It should not be necessary to make turns, use other circulation space, or otherwise slow and impede access to the out-of-doors. All doors should swing in the direction of the flow of exiting traffic.

Ramps, whenever possible and particularly in the audience area, should take the place of stairs. There should



PLAN A

The location of the auditorium and many of its necessary facilities in one wing allows its use as a unit. Inclusion of sanitary facilities for both men and women in or near the lobby unit would aid, although the girls' washroom can be so used. The lobby tends to form a bottleneck although a secondary exit is close by. The shop and homemaking rooms may be used for stage work in making scenery and costumes. Location of instrument storage nearby encourages use of music in the auditorium



PLAN B

Plan B locates the auditorium in the center of the building. Artificial ventilation must be depended upon entirely. The auditorium, in such a location, is subject to noise interference from the large part of the remainder of the building. The entire school must be in use when the auditorium functions. Doors from storage and dressing rooms lead directly onto the stage, precluding use of the stage wall for cyclorama purposes. Such dressing rooms are of little use, being small and on stage. Exit from the auditorium is either through the one narrow corridor to the front of the building or by way of the corridor exits at the extreme sides of the building

be no steps leading from the outside corridors or entrances to the auditorium seating levels.

Isolation of the auditorium from sources of danger should be possible.

The stage should be provided with a fireproof curtain to isolate it from the audience area in case of emergency. Direct exit from the stage to out-of-doors is necessary.

Projection and lighting booths should be fully fireproof in construction and equipped with automatic fire protection devices.

Protection of the audience on its way to and from the auditorium should be aided by the design of travel routes.

Pedestrian pathways leading from sidewalks and the street should not cross automobile roads serving the communication center. Routing of patrons leaving cars in parking spaces should be so arranged as to avoid danger from other cars entering or leaving parking spaces.

II. Comfort—The Location and Accessibility of the Auditorium Should Assure the Comfort of Its Occupants.

Proper ventilation of the auditorium seating space will contribute to the comfort of the occupants.

Natural ventilation is the cheapest and, in many cases, the most effective means of providing sufficient circulation of air. This type of air circulation is best induced through bilateral ventilation. As a minimum, at least one side of the auditorium should be open; that is, be equipped with windows for ventilation purposes. It has rarely been found that windows opening on a closed court have offered any great help in ventilating large audience spaces.

Artificial ventilation, in all but the smaller type theaters, is a necessary supplement to natural air flow. This is expensive, both in terms of equipment and installation. Unless elaborate, this type ventilation, unaided by natural circulation of air, does not meet the requirement of aiding the comfort of the occupants of the audience section. Recent trends toward construction of windowless theaters place additional emphasis upon artificial air conditioning. A very efficient system is necessary if all windows are to be eliminated from the auditorium seating space.

Travel lines in the auditorium should add to the comfort of the occupants.

Aisles should be wide and slip-proof. Aisle lighting is helpful in aiding late arrivals to find seats and to move up and down aisles if the audience section is darkened.

Distance between rows of seats should be sufficient to allow the passage of people along these rows without inconveniencing other occupants.

Sanitary service facilities within the auditorium unit will add to the comfort of the occupants.

Rest rooms and wash-rooms for both men and women should be located within the auditorium unit. These are preferably located about the lobby, as there they are more accessible to all sections of the auditorium seating space.

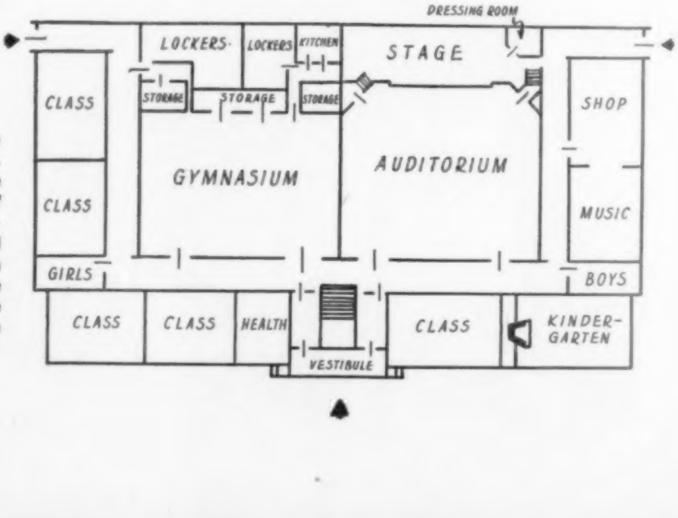
Drinking fountains should be installed in the lobby unit or wherever the audience can easily reach such facilities.

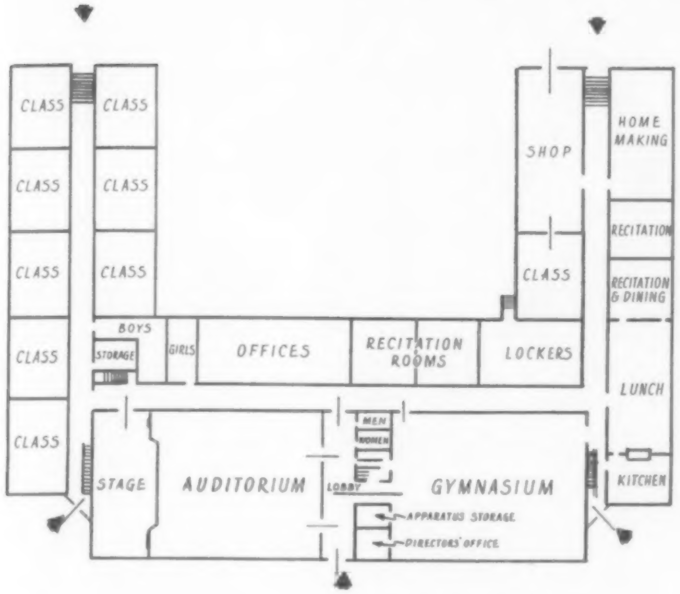
The use of regular school sanitary facilities is acceptable whenever such services are located near to the auditorium unit and when such use does not require opening large sections of the school plant. The attempt should be made to provide an auditorium unit that can operate without drawing upon the facilities of other sections of the school plant.

The comfort of the audience depends also upon easy access to means of transportation.

PLAN C

The gymnasium and auditorium are side by side, and noise from one will interfere with the use of the other at the same time. Similarly, the auditorium cannot be used separately from the remainder of the building. Music and shop rooms nearby, if carefully soundproofed, will contribute to the effective functioning of the auditorium. Complete reliance upon mechanical ventilation is required because of the nature of the auditorium placement. Exits from the auditorium are poor and will cause confusion and discomfort whenever any large number of people use the auditorium. Dressing-room space is totally inadequate and poorly placed





PLAN D

Placing the auditorium and gymnasium to the front of the building has many advantages, one of which is the joint use of complete lobby facilities. Placement of the shop and homemaking rooms nearer to the auditorium unit would aid work in the productions. The kitchen is so placed as to be of use in case the gymnasium is opened for a general social evening after the auditorium performance. Boys' and girls' washrooms are so located as to be readily available for use as dressing rooms

Parking spaces.—With the increased number of automobiles, coupled with the tendency toward consolidated schools serving wider geographical areas, it is necessary to make provision for the efficient handling of large numbers of cars. These can best be cared for in parking areas located on the school grounds. Nearness to entrances, availability for use by both school and adult population, and the need for parking cars of spectators at athletic events or of adult users of athletic equipment and plant, should be considered in planning this feature of the grounds.

Driveways and walks should be provided that lead directly to the public entrances of the auditorium unit. Care should be taken that there be a minimum of discomfort in moving from automobiles to the auditorium entrances in times of inclement weather.

Access to public transportation systems is a criterion for the location of a school as well as the auditorium unit. No community auditorium is worth erecting if the public—and that includes those not possessing automobiles—cannot get to the building. However, care should be taken that noise from such transportation systems should not interfere with programs carried on in the building.

The comfort of the occupants is increased through speedy means of mechanical control and service.

The box office, usually located in the lobby near and convenient to the audience entrances, should be equipped and planned to facilitate expedient handling of large numbers of people.

Ticket collection points should be made possible through centralization of entrances, while at the same time allowing for easy, swift traffic through such points.

A check-room, large enough to provide storage and service space sufficient to handle the wraps of a major part of the audience capacity, should be located off the lobby. It should be so placed that use of it by large numbers of people will not interfere with passage by the remainder of the audience through the lobby to the exterior.

III. The Location and Accessibility of the Auditorium Unit Should Encourage and Stimulate Wider Use of the Communication Center by the School Population.

The auditorium unit should be easily accessible to the remainder of the school plant.

Entrance to the auditorium seating space should be from one of the main travel corridors of the school building. Several wide doors should open into the wide corridor from the auditorium seating space. Aisles in the auditorium should be wide and sufficient to carry the number of students without creating traffic difficulties. Bottleneck conditions should be avoided. Provisions should be made, in planning the number of entrances and doors, for the easy handling of the large number of students that will converge on this point at the same time.

Requirements for the central location of the auditorium are changing with the change in emphasis on, and function of, the auditorium unit. Fewer schools require that all students attend assemblies at the same time. On the contrary, the trend is toward the construction of auditoriums of smaller seating capacities to serve fractions of the total school population. Consequently, if the function is to serve only portions of the school group at one time, travel time becomes less important. If this point of view is taken, the auditorium unit need not be located at the very center of the plant in order to be equidistant from most points, but may be located in a wing or in a separate building.

Access to the stage and related workrooms should be direct and easy. Such access should not be through the auditorium seating space, as travel of this sort would interfere with activities being carried on there at the same time. Emphasis at present is being placed upon participation by large groups of students in the many activities connected with the communication center. Temporary solutions, such as passage under the auditorium seating area, will not serve the needs of large groups of students.

IV. The Location and Accessibility of the Auditorium Unit Should Encourage and Stimulate Wider Use by the Adult Community Population.

The entrances should encourage adult use.

A community entrance should be provided separate from the school entrance. The audience should be made to feel, through direct entrance to the auditorium seating space, that they are entering a space designed for community use, not encroaching upon school property, suffered there as visitors, and obviously barred from the rest of the building. It would be well, then, for the auditorium to have its own lobby and service facilities, and be somewhat distinct in its architectural location in respect to the rest of the school plant.

Access to the stage and related areas will encourage adult use.

Use of the auditorium by the community cannot be limited to participation only as spectators, but must also

include the use of the stage and related areas, music rooms, workshops, and the like, by adults. In planning for that phase of the adult program, whether it be through use by the local Little Theater group of the school for practice, local music groups, or adult classes in drama and music, arrangements must be made for the use of the entire auditorium unit as a separate entity. Some means of access to the workshops, stages, and related rooms must be provided. Passage should never be through the auditorium seating area, since this would interfere with activities being carried on there at the same time.

Independent servicing of the auditorium unit will encourage adult use.

Heating, lighting, and ventilating systems should be installed so as to permit the serving of the auditorium as a separate unit, when only that section of the building is to be used.

The lobby is important in encouraging adult use of the auditorium unit.

Traditional use has dictated the reception arrangements of the school auditorium. To be impressive, austere, or dramatic has been the aim. Lobbies were, in most instances, enlarged corridors, rather over-decorated in a cold, formal style. The lobby, however, holds a strategic place, particularly in the use of the school by the adult audience. It has often been repeated that the first impression is the most significant. It is the role of the lobby to create a favorable first impression, to put the audience in a receptive frame of mind, to provide the transition from the status of an individual in a community to that of a member of a group.

The lobby holds further importance during intermissions and at the close of any community event. When the adults of a community have been drawn together from their separate ways, what a waste it is that when the house lights go up, the audience is already on the run toward the exits. The main body of visitors surges to the doors, and, by mere pressure of numbers crowding into a narrow corridor, they crush themselves out of the building, into their cars, and back to their individual homes. When the trouble has been taken to provide a common community experience, the lobby should be a place in which members of the audience can mingle with one another, renew friendships, and exchange ideas and thoughts about the production they have just witnessed. The lobby should encourage this by its friendliness, and its cheery comfort. It should be a place in which to gather, to meet friends, to participate in the social amenities under the most favorable surroundings. The lobby should be spacious and serve as a "living room" for the more formal seating space of the auditorium. In planning the building it may be well to consider supplementing the indoor lobby by carefully designed gardens about the auditorium to serve as an outdoor lobby.

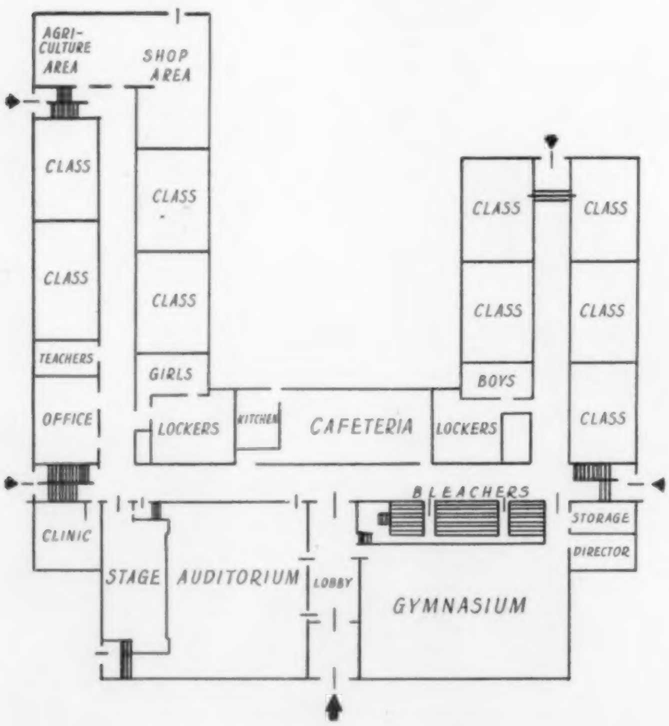
V. The Location and Accessibility of the Auditorium Unit Should Indicate the Close Relationships Between Drama, Speech Arts, Music, the Fine Arts, and the Dance.

The auditorium, the stage, its associated workshops, dramatic arts rooms, music studios, speech laboratories and the like should be carefully placed in recognition of their generic interrelations with one another, and in consideration of the relationship of that group of activities with the remainder of the school plant. Stagecraft is essentially laboratory work and requires carefully planned space in which to work freely and for the best results. Music, the dance, and speech arts likewise require rooms that are designed about the type of activity that will be carried on in them. These activities are becoming more secure in their positions as an integral part of the school curriculum. The spaces should be so located that the contribution from any or all units to a stage production may be easily and efficiently made. At the same time an architectural welding of these activity spaces with the remainder of the building is desirable. The location must preserve the atmosphere, the isolation for concentrated work, and meet the demands upon the building that stem from the nature of the activities carried on in this area.

VI. The Location and Accessibility of the Auditorium Must Provide the Atmosphere for Concentrated Work.

The auditorium unit should be free from noise distractions.

Auditorium work for the most part is concerned with the use of sound, motion, and light in a highly concen-

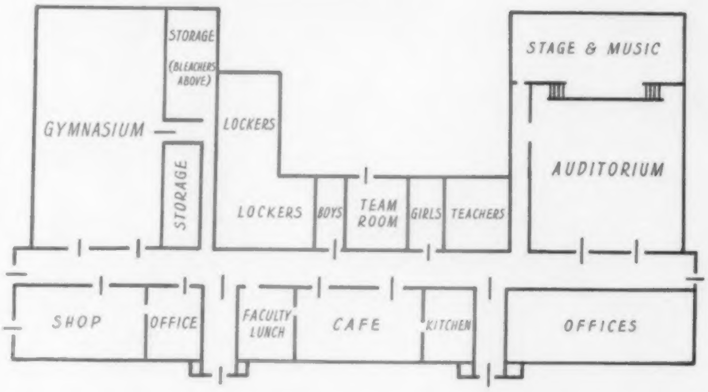


PLAN E

Plan E uses approximately the same general position of the auditorium unit in relation to the remainder of the building as does plan D; however, placement of supporting units has not been carried out with the same degree of awareness of the peculiar needs of the auditorium center. Lobby facilities; complete dressing room space, that for boys being lacking in the vicinity of the auditorium; and lack of connection with music rooms, are some of the points needing attention. The stage is crowded and hampered for space by reason of the circulation corridors adjoining. The auditorium is shaped badly for good sight lines. Access to the school and the outside is quite good

PLAN F

Plan F suffers in accessibility by the placement of the administration unit directly in front of the auditorium doors, necessitating roundabout entrance and exit to the auditorium seating space. Access to the stage is provided by a corridor leading alongside the seating space. No dressing rooms, shop space, or lobby facilities are provided, requiring therefor that the remainder of the building be used for that purpose



trated fashion. For that reason it is necessary that there be careful consideration of the separation of the auditorium unit from possible distraction. The gymnasium should be located at a distance. Shops similarly should be segregated from the quieter arts by being placed at remote points of the plant. The stage workshops, music, and other laboratories in which work is often accompanied by distracting sound should be somewhat soundproofed and separated from the stage and auditorium by intervening rooms, as dressing rooms, or costume and property storerooms.

Effective location and accessibility of the auditorium facilities will add to the effective use of light.

The use of the auditorium for dramatic purposes involves paying special attention to lighting. With the rapid increase in the knowledge and use of artistic stage lighting, as practiced in our professional theater and in schools more progressive in this respect, comes the demand that the auditorium be more carefully planned to facilitate this work. Many of our better professional theaters are built entirely without windows, dispensing with natural light and depending entirely upon artificial lighting.

The school presents a somewhat different case. Although dramatics and, with the increase in visual aids, moving pictures require that a great amount of time be spent in darkness, there are many times when natural light would be not only allowable, but desirable. School assemblies, musical performances, forums, and large group meetings require, in the usual case, no extraordinary lighting and are aided by fresh air, sunlight, and the accompanying refreshing atmosphere.

At times when it is necessary to have complete darkness, some means should be provided for darkening the auditorium. This may best be accomplished by the inclusion of electrically operated blinds carefully constructed and planned for at the time the building was erected. This will necessitate a system of mechanical ventilation to operate when the blinds cut off the natural air circulation.

The relation to location is obvious. If natural ventilation and sunlight are desirable, it is necessary that the auditorium have adequate window space. This should be on the outside of the building and not facing on a closed court. Bilateral lighting and ventilation are most desirable, with unilateral ventilation and lighting a minimum requirement.

Lighting ports in the ceiling, an innovation in school design, are reached by means of catwalks across the top of auditorium ceilings. Attention should be paid to access to these walks in order to make more effective the operation of this type of lighting.

VII. The Location and Accessibility of the Auditorium Unit Should Provide the Arrangement of Spaces Best Calculated to Forward a Program of Creative Craftsmanship Culminating in Artistic Productions in the Fields of Drama, Speech, Music, and the Dance.

The stage may be considered as the center of a group of laboratories and preparation rooms. Actual use of the stage is the culmination of weeks of preparation in the planning rooms, library, rehearsal rooms, orchestra practice rooms, workshops, costume preparation room, and the like. On the stage the various related activities are fused into some production, dramatic, musical, or assembly. If the stage is a laboratory center, it is necessary that it be so placed that the students may carry on many activities and prepare for a wide variety of productions at the same time that the auditorium seating space and stage are in use. The inclusion of the work in drama, music, speech arts, and the dance in the school curriculum is an indication that the vital center of these activities, the stage and its laboratories, should be a major part of the school plant.

Accessibility of the stage as the working center of the unit.

Access from the auditorium seating space to the stage should be provided through doors in the proscenium walls on either side of the stage opening. Backstage stairs should lead from these doors to the stage level. It is not necessary to have stairs leading from the auditorium seating-level to the apron of the stage.

Access from stage to related areas.—A corridor behind the rear wall of the stage is very desirable. Such a passage would provide for cross-overs to either side of the stage during performances and would insulate the stage to some degree from the noise of the workshops. Several doors should open from the stage onto the corridor. Provision should be made for fairly direct access from music rooms to the stage.

A clear passage from the stage to an outside loading platform will allow for easy moving of material and properties.

Workrooms should contribute to the effectiveness of stage work.

Workrooms should be planned in conformity with best practice in designing other shop units and in conformity with the requirements of the specialized work carried on here.

A maximum amount of natural light should be provided. *Northern orientation* is preferable.

Workrooms should be located near but not adjacent to the stage. The noise attendant upon the work in these shops would hamper use of the stage. Soundproofing would contribute to their usefulness.

Doors and corridors along which scenery must be moved should be constructed to accommodate readily large pieces of furniture and scenery; 8×12-foot double doors and a corridor of the same size from stage to workroom would probably facilitate movement of scenery.

Direct access to the outside will facilitate delivery of material.

Washroom and toilet facilities should be available near the shops.

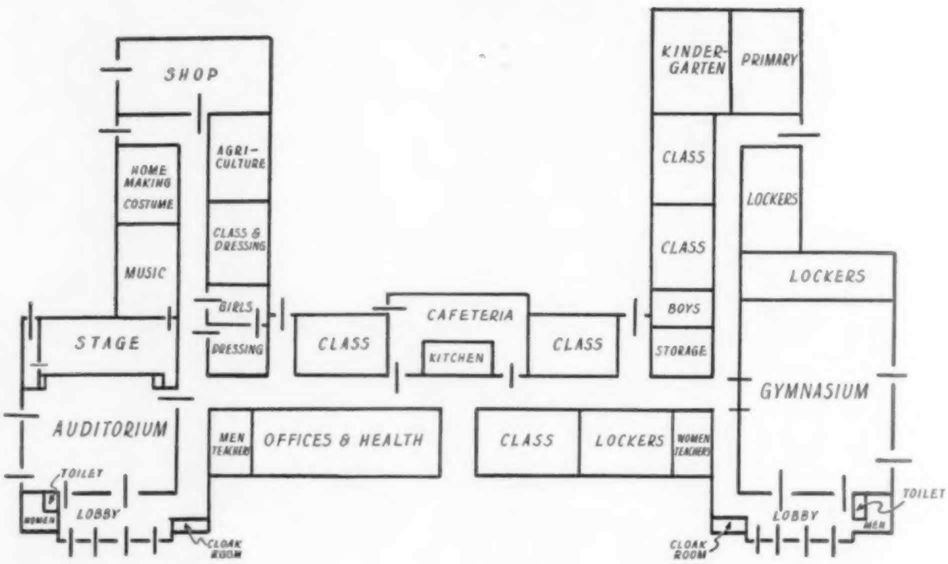
Provisions for community use should include a door to the outside to allow adult use of the workshops at night without entering the remainder of the building.

Storage of scenery.

Scenery storage space should be located near the stage.

PLAN G

Plan G represents careful planning of spaces from the standpoint of accessibility and location of the auditorium and supporting areas. The stage is a center of shop, costume, music, and dressing spaces, all of which are easily accessible to the stage proper. Access from both outside and school is convenient, quick, and safe. The auditorium unit can be isolated and used separately from the remainder of the building



The space below the stage is often utilized for this purpose. If so, trapdoors or stairways must be large enough to allow passage of the largest pieces of scenery used. Property and costume storage may be similarly located.

The contribution of music should be stimulated by the location and accessibility of music units within the auditorium unit.

The musical rehearsal room, planned for both community and school use, should be located near the stage. This would serve as an assembly and retiring room for the musical organizations when they perform in the auditorium.

An instrument storage room should be planned adjacent to the rehearsal room.

Access should be provided directly to the stage and to the auditorium seating space or orchestra depression.

Practice rooms, chorus rooms, and offices may be included to round out the offerings in that field.

Effective use of the out-of-doors should be planned.

Progress has been made in landscaping outdoor areas to serve as open-air theaters. The outdoor theater should be so located as to allow the use of such indoor facilities as dressing rooms, music rooms, instrument storage and workshops. Provision may also be made for the use of public facilities grouped about the auditorium and outdoor lobbies.

The contribution of other fields should be recognized according to the program and needs of the community.

More comprehensive and elaborate plants will contain stagecraft classrooms, planning rooms, libraries for research in costume designing, costume and property preparation rooms, speech rooms, dance studios, and offices. These should be developed in relation to local school and community needs and responding to the changing school curriculum meeting the demands for the incorporation of such spaces into the building program.

Physical relationships obtained through grouping together rooms for the instruction in the speech arts, the dance, the fine arts, and the like, will serve to confirm the close relationships that these allied fields should have in the community program.

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THE UNIVERSITY LIBRARY BUILDING

By FRANK K. WALTER

University Librarian and Director of the Division of Library Instruction, University of Minnesota

JUST what the future university will be like in curriculum and equipment is a matter for conjecture rather than confident prediction. The same is true of the future university library building. For a long time, as courses of study were fairly stable, the increase in registration gradual, and the annual increase in volumes of the library relatively small and regular, research was not very extensive. Under such conditions it was comparatively easy to provide satisfactory library facilities in a building of more or less conventional design which would serve its purpose for several decades or until unexpected accessions crowded its shelves.

In the older type of library building in the average university it was usually considered sufficient to provide two or three large reading rooms for general reference works, periodicals, and reserve books; a general circulation desk, and a bookstack as large as permitted by the building site and the appropriation for the building. An office for the librarian, a varying number of workrooms for the staff, and a service basement, were usually added. Later, special rooms for seminars and other special groups, stack alcoves for individual scholars, and additional workrooms for added activities or services, were provided as local need and opportunity suggested. Since the library was often one of the most prominent buildings of the campus, architectural effect was usually emphasized—often at the expense of maximum utility.

The Requirements of Research

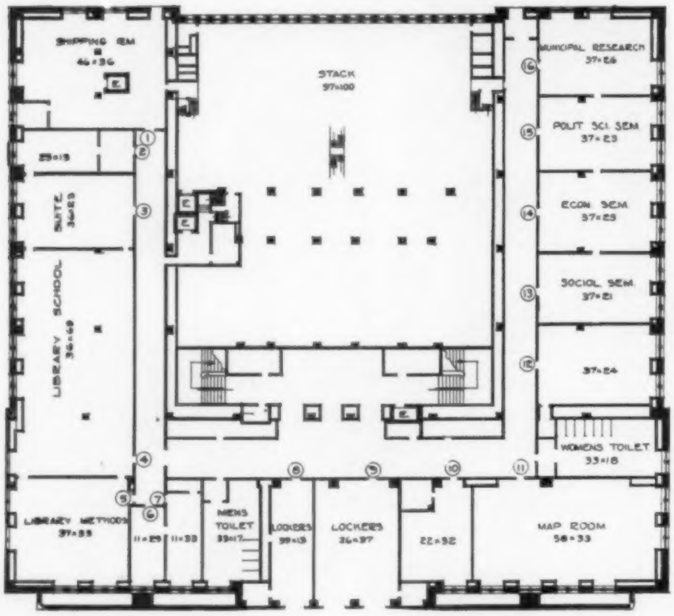
The increase of interest in research with the consequent widening of the curriculum has multiplied the fields and specific subjects on which the library must furnish material and has made systematic provision for increased book storage uncertain in any growing institution. This necessarily means provision at the outset for such increase. The teaching and application of research method in even the undergraduate classes, and the inevitable class report and term paper resulting from this, make it necessary to provide for increasing use of reading and study rooms in any institution which does not limit its registration. Even in one with such limit more intensive research will cause more extensive use of such rooms as the base of research is widened.

Intensive research, whether in laboratory or library, requires at least comparative privacy and as easy access as practicable to necessary apparatus or books. This implies alcoves, special study and reading rooms, and private studies for major research in variety and numbers unthought of only a relatively short time ago. The location of these rooms in relation to general reading rooms, the public catalog, and the portions of the stacks in which the related books are stored is a complex question. Here, again, there is a great difference in the problem in a slowly growing library and one in which new subject-holdings are added rapidly. In a university in which there are many professional or technical departments it may be a valid question whether the university community is better served by physical centralization of the common book stock, or whether the library building shall be the administrative center of a university library system with small auxiliary working collections of essential reference books in the various departmental quarters. In the case of large universities, separate auxiliary divisional libraries of rather wide scope and a considerable stock of books, and each with a competent staff of its own serving as an integral part of the general library system, may be the best. Determination of the general policy to be followed in this respect should precede the erection of a new building or extensive alterations of an old one.

In a large campus without a general plan of grouping buildings according to their related activities, some such physical separation is almost unavoidable. Even under such conditions it is better to reduce the number of branch libraries to the smallest practicable number. Economic as well as intellectual interests suggest this. A large branch library can be administered more economically both in upkeep and staff than an equal number of books scattered throughout a large number of laboratories, departmental study rooms and faculty offices, if efficient service is considered.

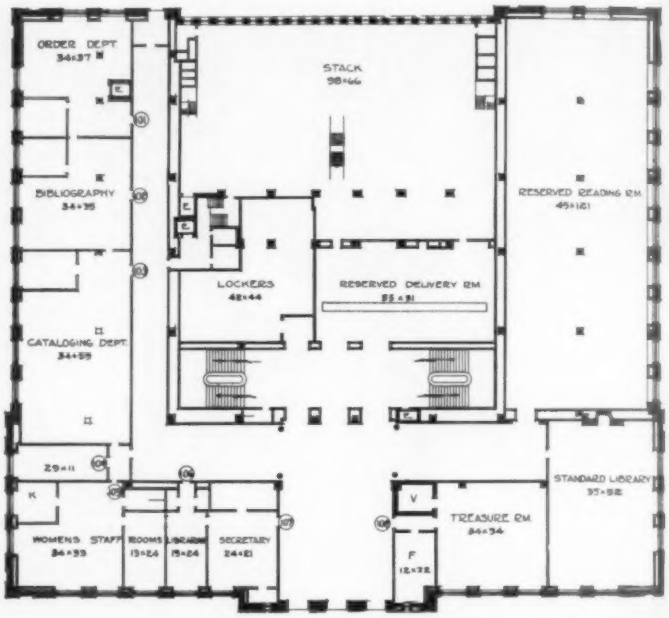
Increase in Essential Material

This correlation of book resources is even more desirable than formerly. In the first place, particularly in the physical sciences, the interrelation of fields once considered separate is becoming closer. The very names of several major fields—for example, mathematical physics, biochemistry, physical chemistry, economic history—indicate this. In the second place, new inventions and techniques are being more closely related to the books and pamphlets which for



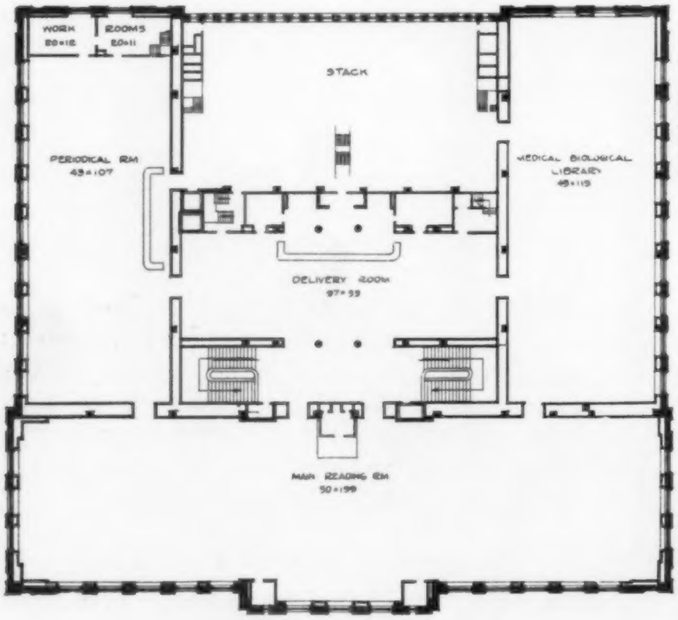
Left—Basement Floor

Includes public lavatories, the Division of Library Instruction classrooms and offices (Nos. 3 to 7), Municipal Reference Bureau (Nos. 15 to 16), and the Social Science Seminar Suite (Nos. 12 to 15). The other rooms are used for administrative or other library purposes and are not available for public use



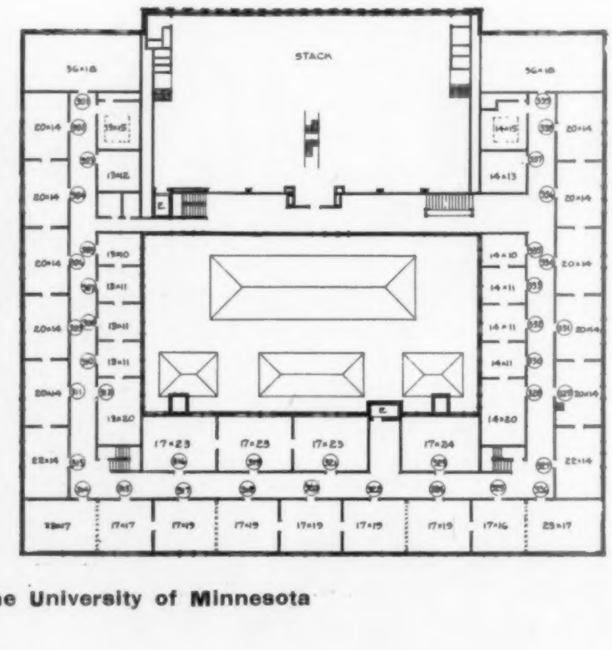
Right—First Floor

Includes the Reserve Reading Room, the Arthur Upson Room (marked "Standard Library" on plan), and the library offices (Nos. 106 to 107, 101 to 104). A public telephone booth and a public elevator (E) to the third floor and basement are also on this floor



Left—Second Floor

Occupied by three large reading rooms: the Reference (or Main Reading) Room, the Biological-Medical Library (here called Medical-Biological), and the Periodical Room, and by the delivery desk and offices of the circulation department. The reference librarian's office is in the Reference Room and the public catalog is in the central hall to the left of the delivery desk



Right—Third (seminar) Floor

This includes three seminar suites: Education and Psychology (Nos. 314 to 326), History and Geography (Nos. 327 to 339), and Literature and Language (Nos. 302 to 313), and graduate discussion rooms (Nos. 301, 312, 328, 329, 339). Admission to the rooms on this floor is by permit only

Floor Plans of the Library at the University of Minnesota

Left—Arthur Upson Room, "The browsing room"

Right—Behind the circulation desk. Note the adjustable filing desks and ample working space

Left—The reserve reading room, seating 338 persons

Right—The general reference room, seating 420 readers

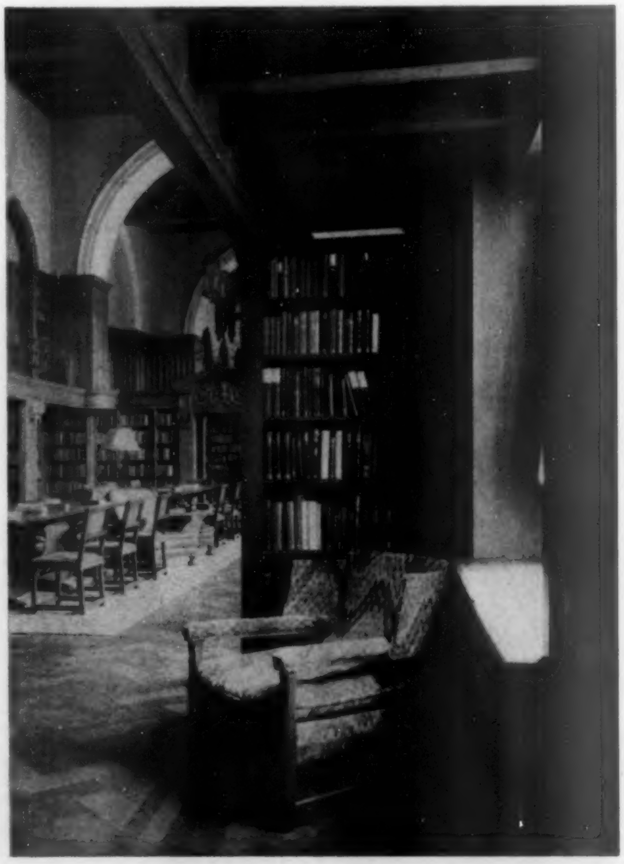
Photographs of the Library at the University of Minnesota

present or which can be foreseen as very probable future additions to the scope of the library. In addition, there must be provision for the uncertain future. This may be either in a site on which additions to the library building can be made as needed, or within the building itself, if the site selected does not permit much later expansion. Obviously, the provision of a site capable of wider occupation is much the more desirable. Space which is definitely limited by the walls of a building on a fully occupied site is almost certain to be inadequate in much shorter time than is usually anticipated.

Choosing a Building Site

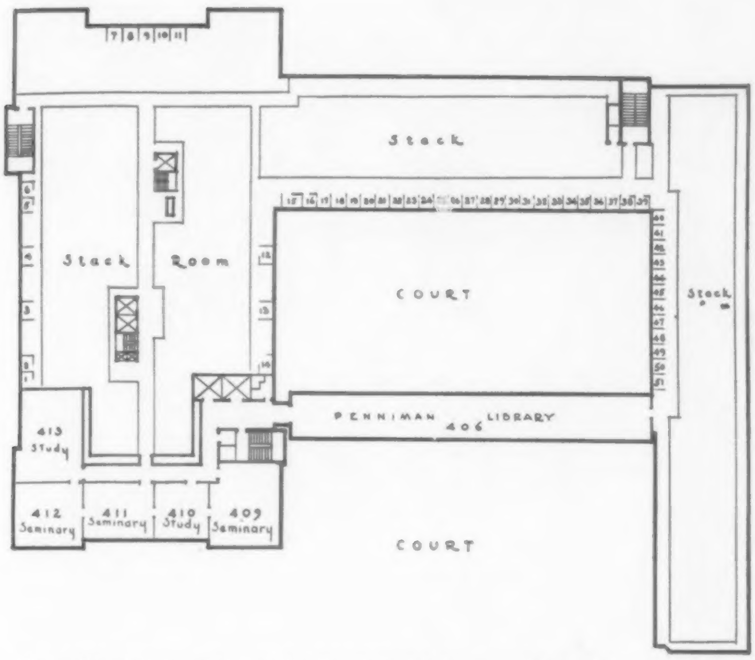
Except on a campus which is relatively new, the choice of a site for a new library building or for extensive additions to an old one is usually limited to whatever desirable space is left unoccupied, and the unoccupied spaces are seldom very desirable. In any case, the general library building should be as near as possible to the scholastic center, if there is any such. If there must be physical separation of library units, the sciences can generally be more easily separated into broad divisional collections than is possible with the humanities.

The Treasure Room (above) and the Tower Room for recreational reading (below) in the Dartmouth University Library



centuries have been the library's chief concern. The university library of even moderate size must now store, for the use of its own public, large quantities of varied materials which in earlier times were systematically cared for only in very large or very special libraries. Examples are maps, prints and photographs, posters, broadsides and other propaganda and publicity matter; manuscript archives; lantern slides and films; phonograph records; collections of current and bound newspapers for schools of journalism as well as for other departments and, most prominent of all in the public eye at present, the microfilm and its elder sister, the photostat. Each of these classes of materials requires more or less special technical treatment in preparation for use and for storage. It seems highly probable that nothing but a serious setback to general civilization will materially check this increase in the variety as well as the mass of material coming within the jurisdiction of the library. No plan for an increase in university library facilities can avoid responsibility for such material.

Since no one can predict the extent of these changes, very liberal provision should be made in any university library plan for future increase in the amount of space allotted to those fields which are active at



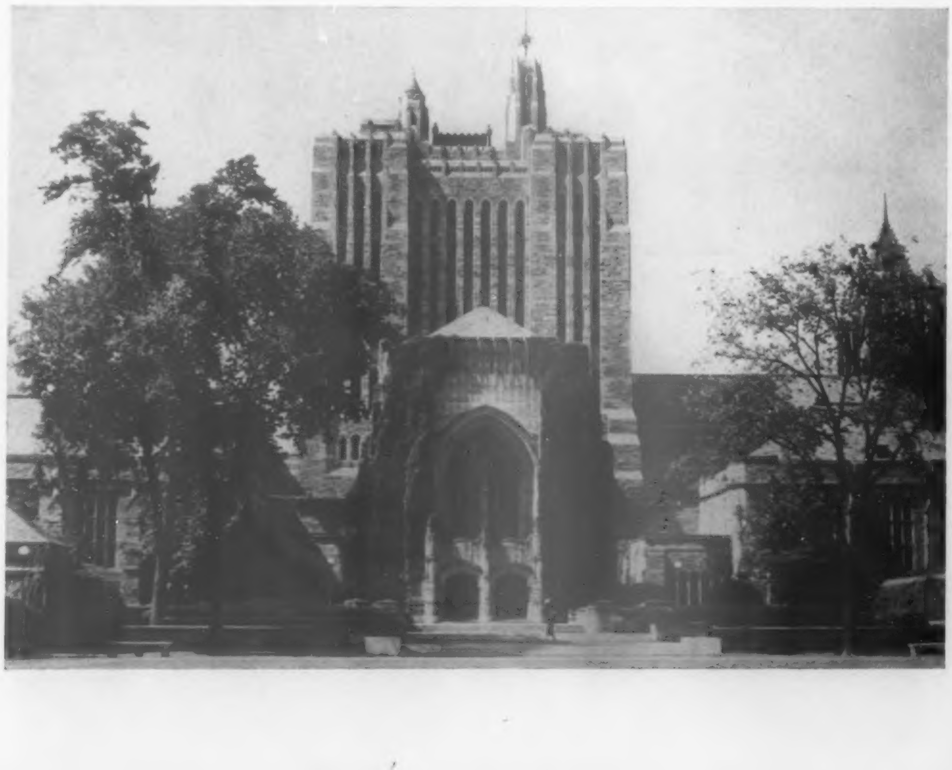
In selecting a site, it is important to consider the possibilities for expansion. As in other buildings, a library can either expand horizontally,—that is, it can remain relatively low and spread over more ground area,—or it can expand vertically by the addition of more stories. An advantage of the horizontal expansion is that needless stair climbing is avoided, and if care is taken in the original plan, additional stories may also be built. The advantage of vertical expansion is greater when ground area is limited. Generous provision for elevators must be made in buildings in which vertical expansion is planned. These, it should be remembered, require constant expenditure for upkeep and operation. A special form of vertical expansion is found in the book-tower devoted to book-storage, as well as small special studies and other rooms for special use. The Sterling Library at Yale is a good example of a tower stack. The Baker Library at Dartmouth is a good example of a modern library with rooms for special uses. It is evident that in any building the amount of possible vertical expansion is limited by structural conditions. It does not lend itself so readily to large study- or work-rooms and consequently is better for the university with a large book collection and a comparatively small student body than for one in which the student registration is proportionately large.

If the site permits, sub-surface book storage may be economical; implying easy excavation and freedom from damp.

The exterior of the building may, and usually must, be left to the architect, but the interior plan should be, and usually is, determined with the help of the librarian. He should furnish the architect data to determine the proportional space given to readers, to book-storage and to the administrative activities of the library. He should also advise as to the extent and character of probable future expansion.

Planning the Interior

The amount of space to be allotted to readers will vary with the character of the curriculum as well as



Top—Fourth-floor plan of Sterling Library at Yale University

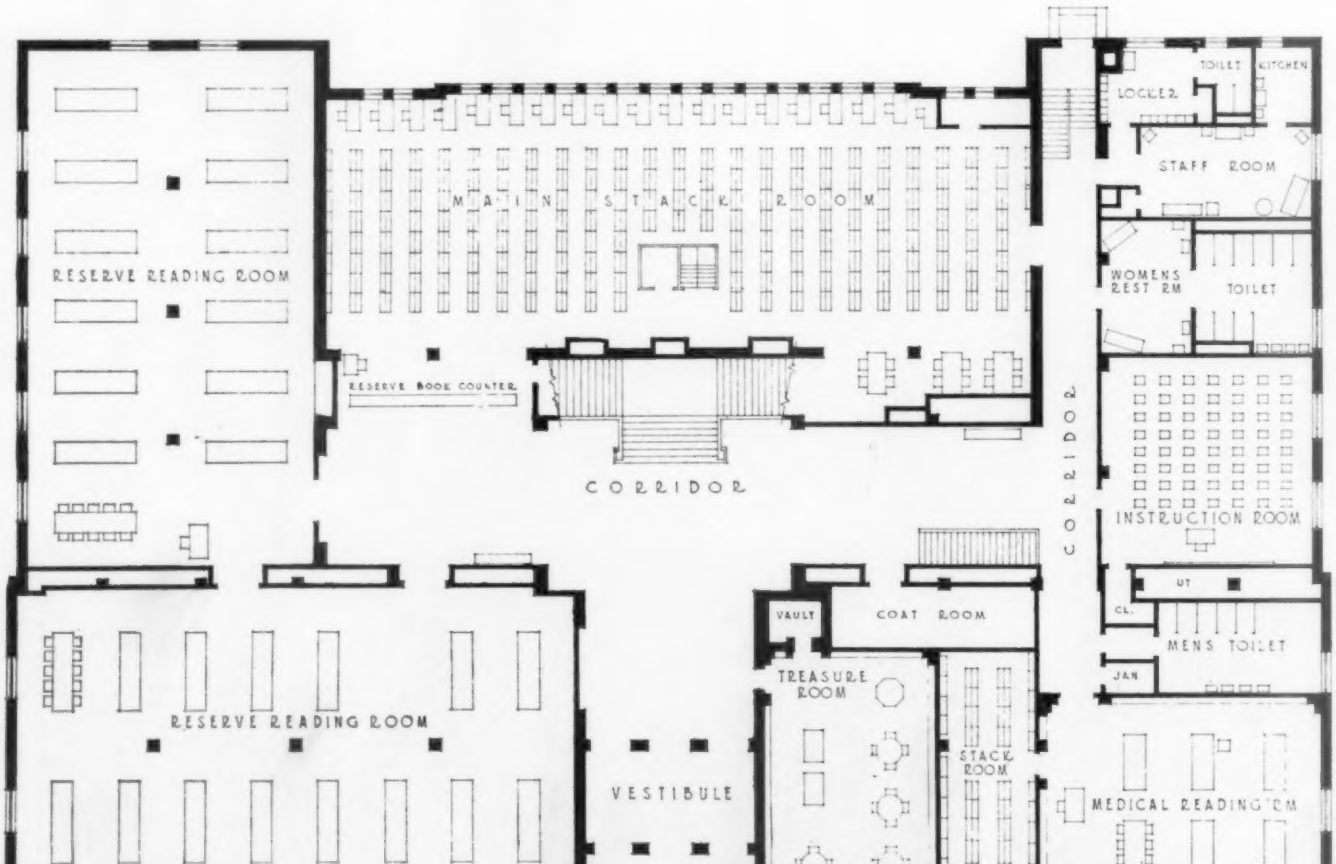
Right—Exterior view of the Sterling Library at Yale University, showing position and construction of the tower stack

with the number of registrants. The so-called cultural studies usually require more use of the library by more students than the pure and applied sciences. It must be remembered that the use of the library is increasing in all fields and at all college levels. The old estimate of space for readers was provision for seats for ten per cent of the student body. This is entirely too small for the present day. Providing for seating for from twenty to twenty-five per cent of the total number of registrants will in most cases leave no more than a reasonable margin for growth in use.

The great reading room with hundreds of seats and lofty ceiling is becoming somewhat discredited. It is hard to discipline and requires a considerable amount of walking on the part of staff and users. Its chief advantages are the possibility of an open-shelf reference library of several thousand volumes in one place, and control by a small staff. The trend toward smaller reading rooms devoted to special fields is noticeable in many recent articles on library buildings and in several new college and university library buildings. These smaller rooms have the advantage of closer supervision and more concentration on smaller fields than is possible in a larger room. On the other hand, a larger staff is required, and if the rooms are served by specialists, the administrative cost is considerably increased. For maximum service the rooms should be grouped so as to bring related subject fields in proximity. This is difficult and sometimes impossible, particularly if the curriculum includes several major divisions. If these rooms are supplemented by alcoves or other study facilities for advanced work in the stack, the problem is easier.

The Staff Working Quarters

The size and location of working quarters for the staff will be determined chiefly by local conditions. The acquisitions departments (order, accession and the like), the catalog department, and at least a good collection of bibliography, should be easily accessible to each other in the interests of economy as well as efficiency. They should also be close to the public catalog. This catalog should also be as accessible as possible to the library public, which is almost certain to use it extensively. If the plan of the building does not permit equal accessibility of the catalog to both public and staff, the general public should receive first consideration, and the extra work of the staff should



Ashton and Evans, Architects

be minimized by service stairways, elevators or other means of quick and easy communication. One detail often overlooked is provision for departmental offices in which records can be kept and conferences held without interruption or undue publicity.

Shipping rooms, printing and mimeographing rooms, the library bindery (if there is one) and other mechanized departments should be in the basement to avoid unnecessary noise and vibration, just as the reserve room should preferably be on the first floor, to save time and confusion at the seasonal peaks just before and just after the beginning of class periods. In planning work quarters, abundant provision for growth should be made. Fifty per cent of margin is likely to prove too little rather than too much.

The Bookstack

In the bookstack a similar margin is desirable, and the probability of increase in the collections of oversized periodicals, art books, newspapers, maps and similar material should be considered. If this is not done, the actual stack capacity will prove much less than the theoretical. For rough estimates, 100 volumes per 5-shelf single-faced unit will be fairly satisfactory, and a stack installation cost of 25 cents per volume will give a working basis for preliminary calculations. Each of the two most common types of stack—bracket and slotted shelf—has its particular advantages and limitations. In choosing, it is well to remember that sales representatives of even reputable companies are specialists in both constructive and destructive criticism. There is more likely to be safety in points of agreement than in differences.

The Lighting System

The question of lighting is a general one and the latest information on the subject should be obtained. Not only fixtures but whole systems of illumination have rapidly become obsolete. Lighting standards of today call for several times as much current and light units as were recommended even a decade ago. Vapor-filled lamps are rapidly taking the place of the older incandescent bulb. Fluorescent lamps are finding present favor in libraries and printing plants, where conditions of use approximate those in libraries. Plans for wiring the building should provide a wide margin of increase in current load, and outlets should be provided far in excess of present needs. Unless this is done, changes in the arrangement of furniture and

Left—General Circulation Hall. Note the modern lighting and the extreme simplicity of the decorations

Below—General Reading Room. Note the Venetian blinds and artificial lighting fixtures, built-in bookcases, upholstered chairs, and provision at the desk for special reserved books

Photographs and plan of the Library at the University of Utah

Opposite page—Ground-floor plan. Although following a conventional plan, note provision for special rooms, the generous provision for reserve books, and the possibilities and limitations of expansion or readjustment

Interior view of a "divisional reading room"

Music Room. Used for daily phonograph record concerts. A place where music can be brought into the instructional program of the University and into the daily life of the students. At Minnesota a similar room is in the Coffman Memorial Union and lending-collections of phonograph records and pictures are maintained directly by the instructional departments in those subjects

equipment are likely to cast unexpected shadows and decrease the comfort and efficiency of those using these shadowed places.

The relation of furniture finish to satisfactory lighting should not be overlooked, since protracted reading is likely to be the rule rather than the exception in university library buildings. Undue glare on table tops will neutralize much of the best effect of the most carefully chosen system of lighting. Modern plastic products of suitable dull shades can be used with good effect for reading-table tops.

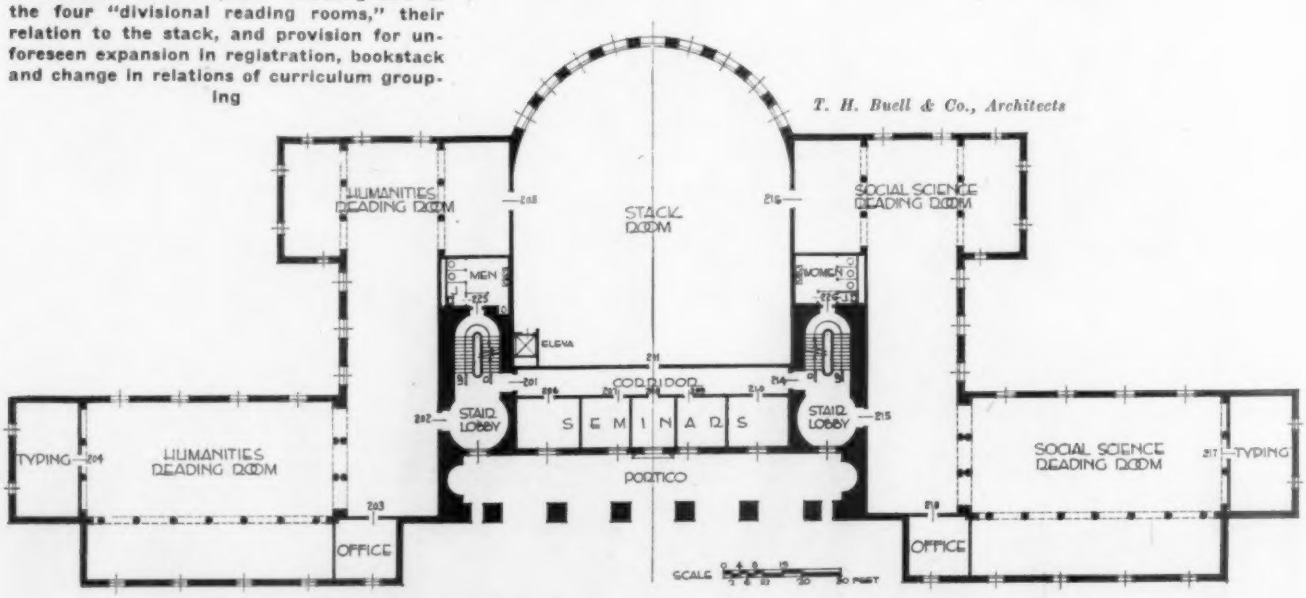
The selection of indirect, direct or semi-indirect lighting is dependent on cost of upkeep as well as reading comfort. High ceilings increase the cost of service and the difficulties of keeping the bulbs or other units regularly replaced to prevent fluctuation in the available light. Badly chosen color schemes have a similar effect. The best choice usually lies between the better types of semi-indirect fixtures for ceilings and walls, and indirect lighting for tables.

Noise Reduction—Air-Conditioning

The development of plastic materials for the reduction of noise as well as for thermal insulation makes it possible to obtain much better conditions for study than previously. When these are combined with air conditioning, the stock of books can be better preserved, as well as the comfort of staff and patrons increased. It is only fair to say that air-conditioning is still more or less experimental and expensive. The new library of Columbia University and the air-conditioning in the additions to the Library of Congress and in other Federal buildings should be studied. The air-cooling systems in local moving-

Below—Second floor plan. Showing two of the four "divisional reading rooms," their relation to the stack, and provision for unforeseen expansion in registration, bookstack and change in relations of curriculum grouping

T. H. Buell & Co., Architects



Above—Layout and interior views of the Library at the University of Colorado

Linonia and Brothers Library Room, Sterling Library, Yale University

picture houses and business establishments may give useful hints. Even if the installation of an air-conditioning system is not immediately possible, provision for future installation can usually be made without undue extra expense.

Service in a university library usually implies a great deal of messenger service, since it is usually impracticable to give stack access to more than a part of the university community. Elevators, book-lifts and other book carriers, and other mechanical aids, are necessary in adequate quantity. Wherever possible, they should be in duplicate, since even the most dependable machinery needs repair and servicing at intervals which are often as disconcerting as they are unexpected.

Changing Needs Are Inevitable

Emphasis must be laid on the use rather than the appearance of the university library building. There is every reason why it should be attractive as well as adapted to use, but the rapidity with which library conditions change suggests that a permanent architectural memorial may not meet present library needs. Elasticity of plan which permits even major modifications of the original plan is of prime importance. The fundamental services of the library—choosing and buying the books, arranging them for convenient use and preserving them from unnecessary abuse—are likely to remain permanent, but the applications are changing and will change still more. The large general rooms will give place to, or be supplemented by, a variety of public rooms devoted to specialties and an even greater number of alcoves and small studies for the temporary use of individual scholars. Services now more or less distinct, such as separate reference collections of books and periodicals, may be coordinated more closely with the circulation desk as well as with the suites of special reading rooms. Acquisition and preparatory processes may also become more closely related. Collections of books for different college levels may be separately housed and administered. To some extent these changes may be foreseen in the building plan. A recent example of such an attempt is the library of the University of Colorado, which seems well planned to meet normal changes in use and registration for some years.

But the best-laid plans of librarians, like those of mice and men, "gang aft agley," and even the best-planned combination for today may not fit tomorrow. Whenever possible, rooms should be planned for eventual use as parts of suites. It is easier to close and lock doors than to cut them in old walls. Partitions should be planned so as to be removable in whole or part, and no service organization should be planned that is incapable of change. The traditional library building is still a good point for departure. It is usually necessary for economy, if not always the most efficient administration, to follow it in part. It is a mistake to fix the traditional form in massive architecture incapable of modification to meet new needs.

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THE HALL OF MUSIC AT PURDUE UNIVERSITY

By WALTER SCHOLER

Architect, Lafayette, Ind.

IN developing a proper solution of the design for the Hall of Music at Purdue University, it was necessary to keep in mind the many varied uses for which the building was to be constructed. In this building will be heard the singing artists, symphonies and lecturers that come to the University about twelve times a year on the Convocation Series. Here, too, will be held the monthly religious convocations that have come to occupy an important place in student spiritual life on the Purdue Campus during the last half-dozen years—and from which many have been turned away because of limited seating capacity. Here will be given concerts by the student musical organizations in which more than 400 students receive the benefit of cooperation in artistic expression. The student musical organizations consist of the 150-piece Purdue Military Band and its Symphonic Band; the 50-piece University Orchestra; the University Choir of 200 voices, the Men's Glee Club, and the Concert Choir, a small group of mixed voices.

The Seating Capacity

There is scarcely a week during the academic year that a conference or meeting of some sort is not being held on the Campus. These usually require an auditorium with a large seating capacity. The Agricultural Conference brings 7,500 or more at one time. There is at least one meeting of the Conference that requires seating capacity for a greater portion of this group.

Having in mind the Convocation Series, religious convocations, conferences, musical entertainments, Commencement exercises and the many other miscellaneous meetings, and that the student body is about 7,500 students, the University authorities desired to provide as large a seating capacity as possible, consistent with a building of artistic merit that could be constructed and equipped within the funds available, which were approximately $1,205,000. After many studies, a scheme was approved which provided for a capacity of 6,208 comfortable seats. This is perhaps the largest seating capacity in the United States in a room of this character, with comfortable seating, artistic surroundings, good vision of any part of the stage and band-shell, and, above all, excellent acoustical qualities. That the student body is appreciative of the Hall of Music has already been demonstrated by the fact that the seats were all occupied when the building was opened by a joint concert by Miss Helen Jepson and Mr. Nino Martini on the two evenings of May 3 and 4, 1940, and further demonstrated by the large crowds at subsequent events.

The exterior of the Hall of Music is a simple and dignified expression of the purpose of the building. In a style following in general that of the Executive Building, to which it is connected, its walls are of concrete and brick, with Indiana limestone trim, encasing a framework of structural steel. The roof is of red tile.

At the center of each side, over the doorways and between the limestone pilasters, are three carved-stone figures representing music, drama, and forensics,

the main activities for which the building was constructed. Above the main stone cornice and below the wall coping are carved-stone panels representing the development of music and opera from their origins to the present radio and cinema.

The aluminum murals at the ends of the main foyer were designed in the architect's office, and executed by Joseph Willenberg, of Indianapolis. They are unusual in that the aluminum sheets were hammered from the back side, by laying the aluminum sheets on an asphalt table top and using special tools designed and made by Mr. Willenberg. When finished, the murals were given an alumilite finish and then mounted on the walnut background. The relief of these murals is surprisingly low.

Stage—Band-Shell—Auditorium

The band-shell, semi-circular in shape, is back of the main stage proper, and by raising a curtain between the stage and the band-shell the two areas become one large stage. The stage opening is 100 feet wide and 37 feet high. In front of the proscenium is the orchestra elevator, measuring 65 feet long and 18 feet deep. This can be stopped at the stage level or at the stage apron level, which is 1 foot below the stage floor, or it can be lowered to the concert level. It can also be lowered to the basement floor level for access from the corridor connecting with the various band and dressing rooms. From the front of the orchestra elevator to the rear of the band-shell measures 100 feet. This provides, then, a floor area of approximately 10,000 square feet for the use of the choruses and bands in presenting their entertainments.

The main auditorium measures 166 feet in width and 156 feet from the back row to the proscenium opening. There are seven groups of seats served by eight aisles for the 3,626 seats on the main floor. The first balcony seats 1,622 and the second balcony 960. The ceiling height at the front of the auditorium measures 56 feet above the floor line.

Interior Design and Coloring

In the design of the interior of the building, particularly in the main auditorium, every line necessary in the solution of a technical problem was taken advantage of to make up the sum total of forms producing the beauty of the design. The zigzag side walls, following generally the gentle curves narrowing the auditorium at the stage, were made up of short sections of walls set at different angles. This is a technical solution and entirely obviates any curved surfaces from which sound waves would rebound to a focal point. This method made it possible to use two shades of blue for coloring and provided triangular spaces for light to be reflected from recessed lights in

Opposite page — The Hall of Music as viewed from the north and south driveway

Right—The auditorium has 6,208 comfortable seats, artistic decorations, good vision of any part of the stage and band-shell, and excellent acoustical qualities

Photographs by Courtesy of Hedrich-Blessing Studio

the top of the pilasters of the side walls. The form of the side walls also produces the effect of greater height than actually exists. The long light-troughs at the main ceiling running parallel with the aisles give the room the appearance of less width than the actual 166 feet.

Much thought was given to acoustical results. Dr. F. R. Watson, of Urbana, Ill., was employed to make these studies. The final results are found to be unusually good, and no amplification is necessary for musical numbers.

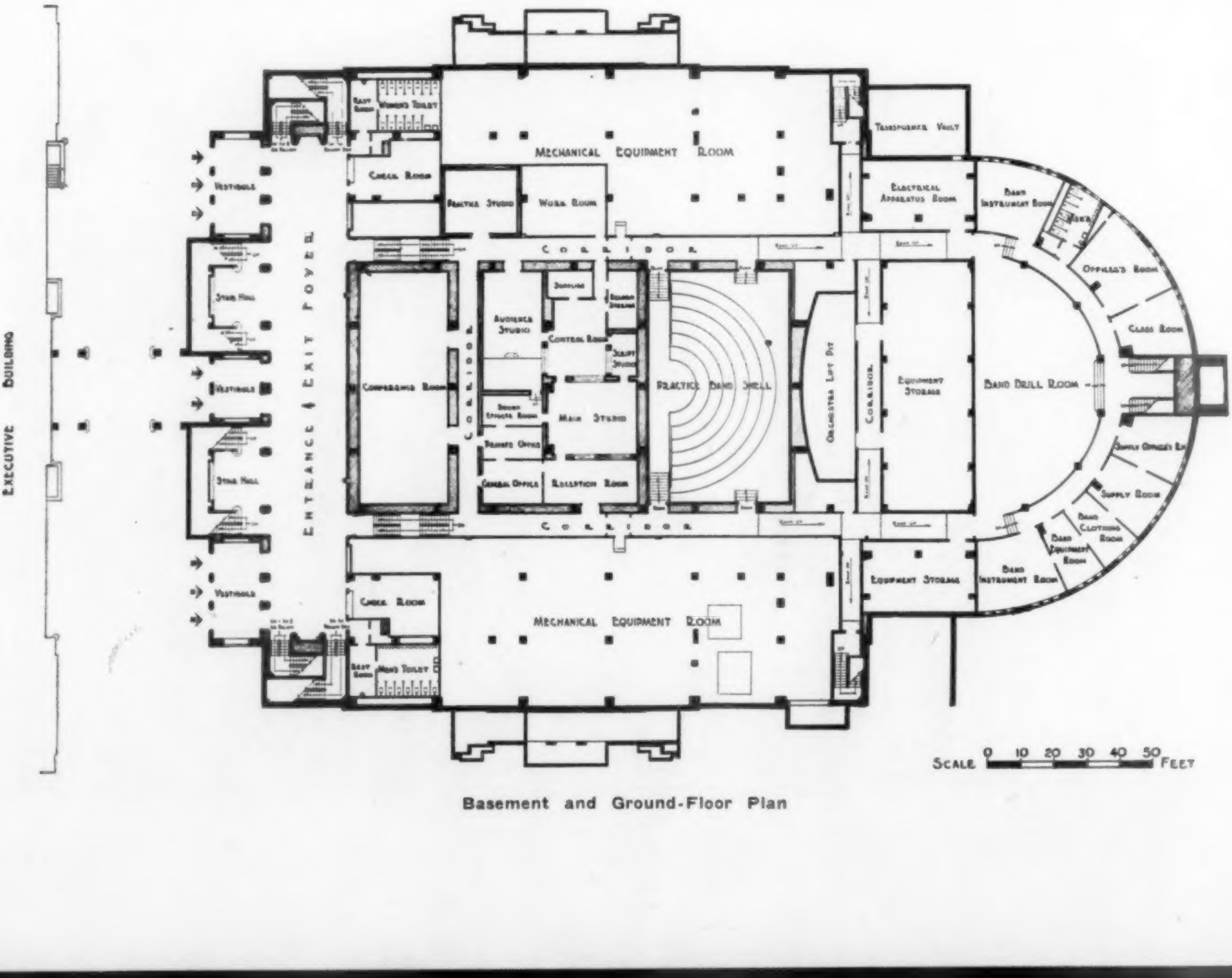
The colors used are pastel blues, grays and ashes of roses. The ceiling is light-gray, and the walls above pilasters are of two shades of blue. The pilasters, which are about the height of the first balcony railing, are painted ashes of roses. The front stage curtains are of blue. The metal seat-backs are of a light shade of ashes of roses, while the leather seats and mohair backs are of blue. The carpets were woven from a special detail prepared in the architect's office. The colors were studied by means of water-color drawings, and then the final shades were selected from samples of available yarns. The colors of the carpets are dark-blue, light blue-gray and dark sienna.

The ground-floor lobby has walls of French Pink Tennessee marble. The stair railings are of a simple design of aluminum. The main floor lobby has walls of American walnut with massive door trim of rounded marble.

The Lighting

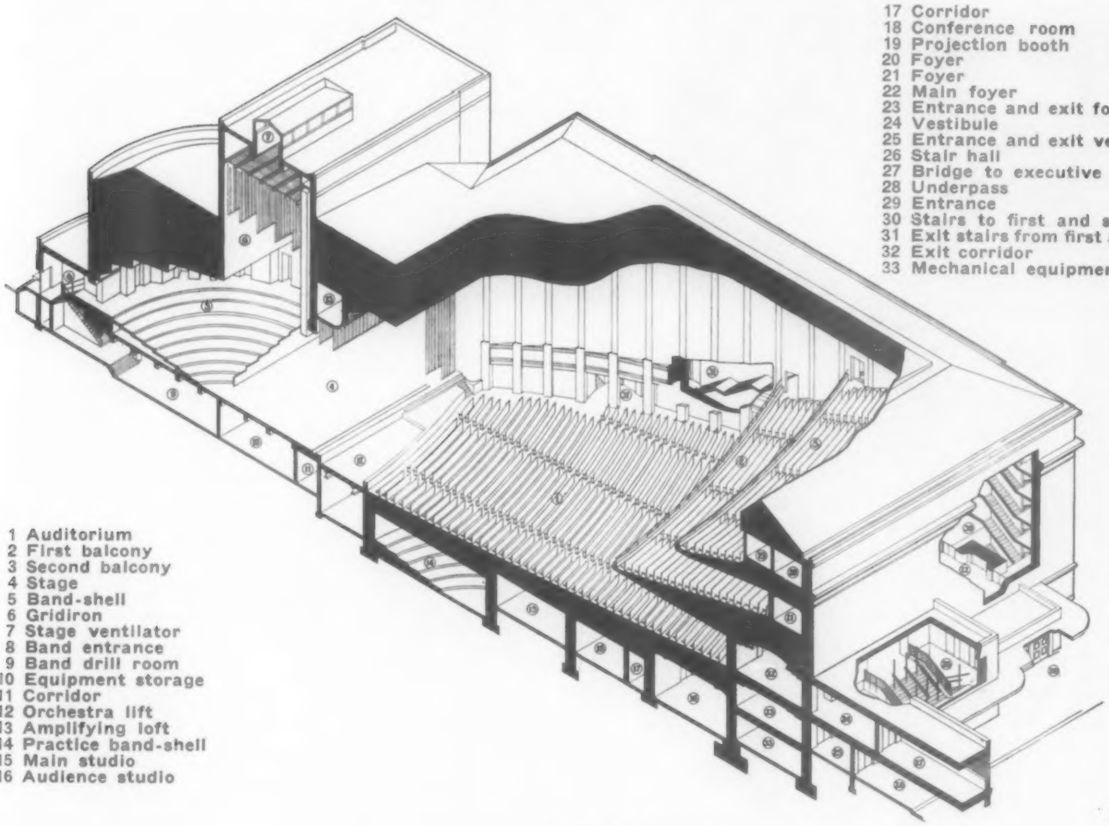
The lighting of a project of this type is one of the most important features from both a utilitarian and a design viewpoint. Much of the design was created by lighting. The lighting of the auditorium is mainly done by means of four lighting troughs running from front to rear of the auditorium. These are roughly spaced over the four center aisles. Then there are the recessed cove lighting panels under the balconies. The foyers also have recessed cove lighting. The lamps are all mazda lamps set in continuous metal reflectors. Along the zigzag side walls there are lights behind the pilasters, located at about the level of the first balcony railing, which throw light upward on the walls. These, when controlled by dimmers, are very effective from a decorative point of view.

Electricity comes into the building at 2,300 volts. After passing through a circuit breaker, the current goes to seven transformers. Three convert the main current to 220-volt for various motors throughout the building; three produce the normal 120-volt, 60-cycle current for lighting; and one produces a 110-220-volt single-phase current for the radio station, public address system and exit lighting. The exit lights or "panic" circuits would be automatically thrown on if



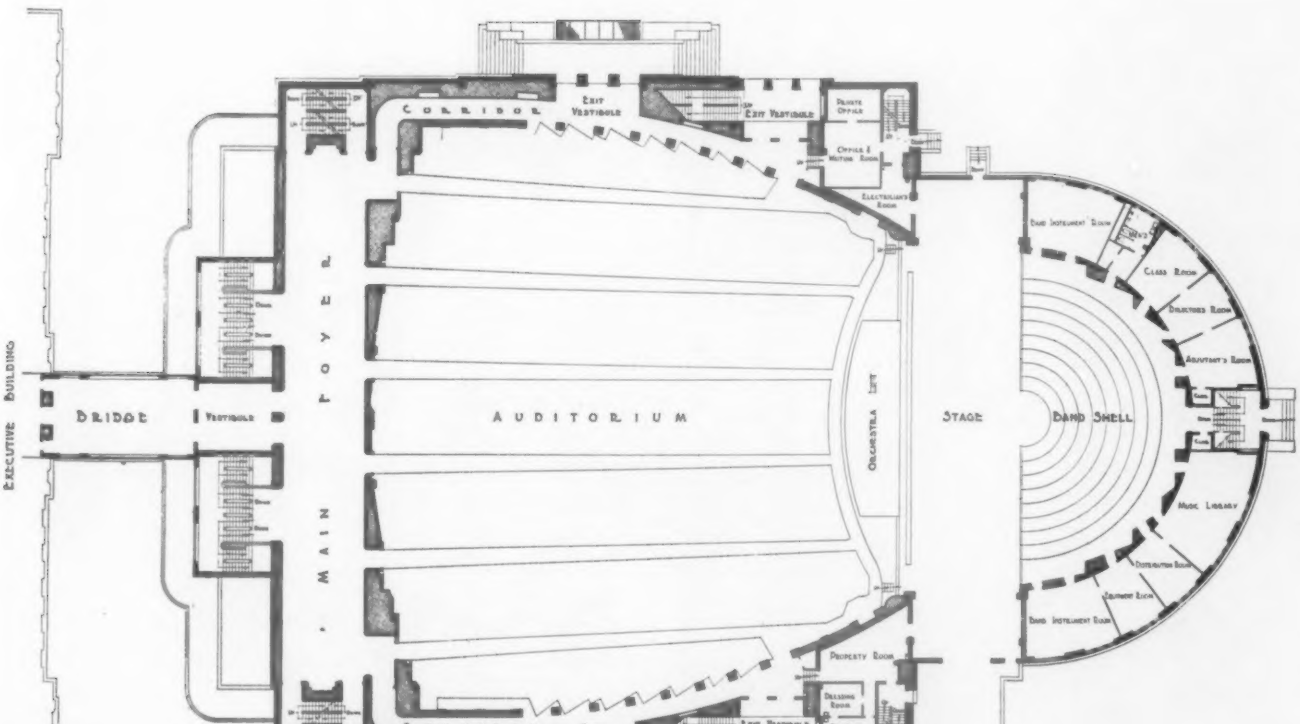
Basement and Ground-Floor Plan

17 Corridor
18 Conference room
19 Projection booth
20 Foyer
21 Foyer
22 Main foyer
23 Entrance and exit foyer
24 Vestibule
25 Entrance and exit vestibule
26 Stair hall
27 Bridge to executive building
28 Underpass
29 Entrance
30 Stairs to first and second balcony
31 Exit stairs from first and second balcony
32 Exit corridor
33 Mechanical equipment room

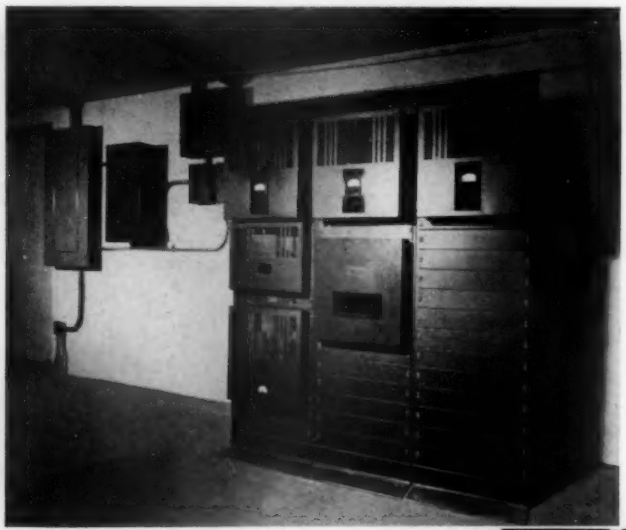


1 Auditorium
2 First balcony
3 Second balcony
4 Stage
5 Band-shell
6 Gridiron
7 Stage ventilator
8 Band entrance
9 Band drill room
10 Equipment storage
11 Corridor
12 Orchestra lift
13 Amplifying loft
14 Practice band-shell
15 Main studio
16 Audience studio

Isometric Section



Main-Floor Plan



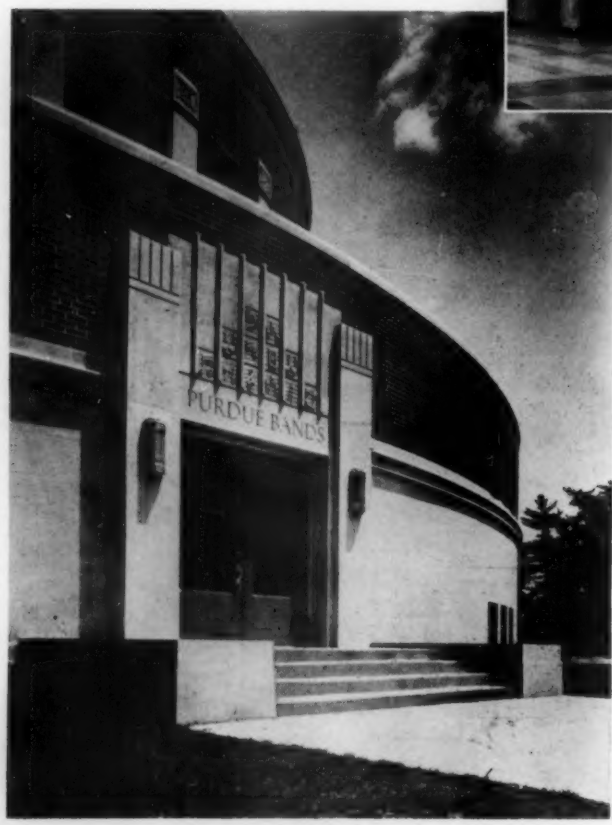
all other lights were out owing to short-circuits in the main lighting arrangement. The stage manager has control of all stage and house lighting. From his portable remote-control board backstage, he can produce any intensity he desires anywhere in the house, and by changing the position of switches he controls the color and intensity of the many stage-lighting facilities. From the low-voltage control board the stage manager's "orders" are relayed to three other automatic switchboards; thus the heavy currents are remotely controlled from one comparatively small switchboard, containing hundreds of small levers and colored pilot lights. There are the usual high-powered spot-lights from the projection booth at the rear of the second-floor balcony. In addition, there are six ports for 18 spot-lights located in the ceiling near the stage opening, so that small areas on the stage or orchestra elevator can be directly illuminated. The angle from these ports is about 80 degrees.

Courtesy of National Theatre Supply Co.

Above—Sound equipment

Right—The ground-floor foyer

Below—The band entrance



Photographs above and left, courtesy of Hedrich-Blessing Studio

Air-Conditioning

A steam refrigeration system is used in cooling the auditorium. It cools 350 tons of water at a time from 52.5 to 45 degrees F. and is capable of handling 1,120 gallons a minute. A cold-water sump in the basement has a capacity of 250 tons of cool water as a reserve for the system. The air filters of the air-conditioning system are of the multi-panel, automatic, self-cleaning type. Filter cells, mounted on an endless belt, trap impurities in the air and carry them into an oil bath, where the impurities are removed.

On each side of the basement is a complete air-conditioning system providing fresh air for the main auditorium. An additional system for the stage and band rooms and still another for the broadcasting studios complete the facilities.

The broadcasting rooms in the basement were designed to accommodate Indiana's first radio station, WBAA, operated by Purdue University. These facilities consist of audience studio, main studio, script studio, control room, sound effects room, offices, reception and supply rooms. These rooms are constructed entirely soundproof, and the walls and ceilings literally float. They are constructed of special padded steel supports, rock wool and plaster, and finished with sound-absorbing materials.

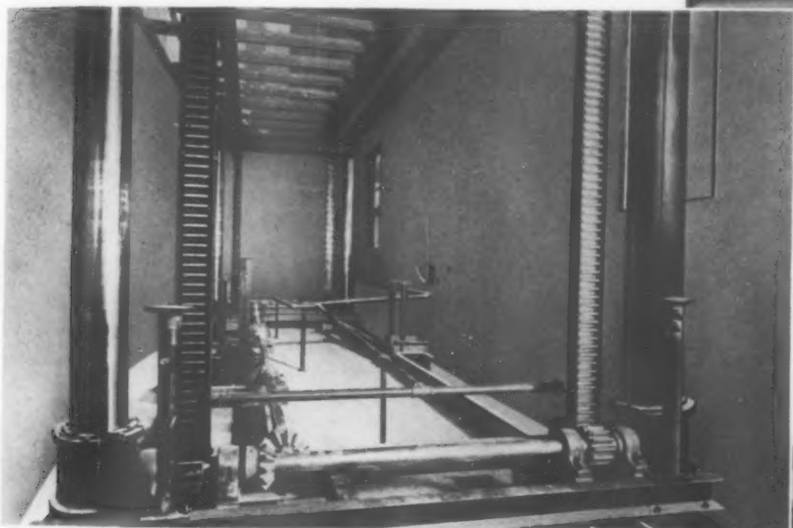
The same type of construction was used for the band practice shell in the basement, which has been found to be entirely satisfactory. A band of 150 pieces cannot be heard in the room directly above.

The auditorium systems are of the reversible type, supplying air from the ceiling outlets during the summer and through the floor outlets during the winter, the same ducts serving as supply or exhaust passages. Air, entering the building through two 9 x 12-foot intakes, is sent through several processes where humidity and temperatures are regulated and foreign matter is extracted.

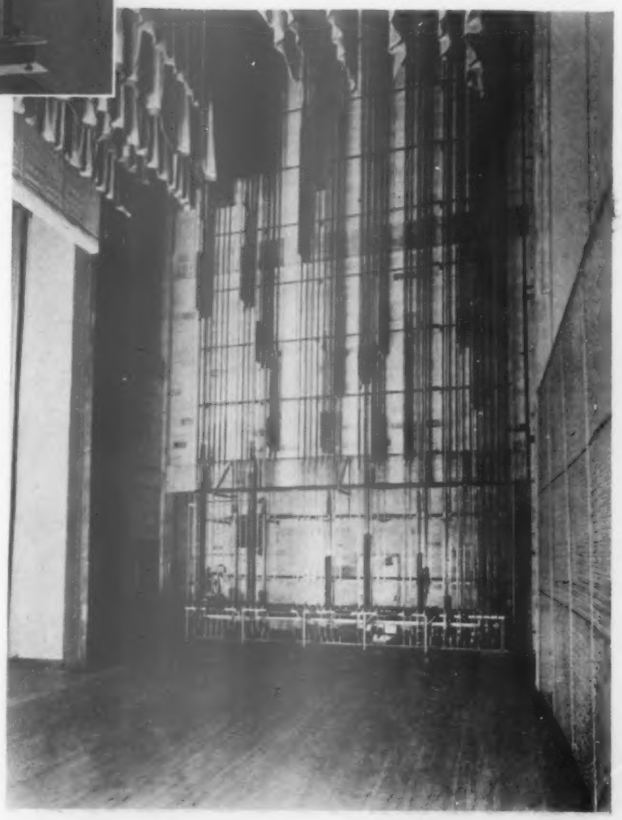
Over the proscenium opening of the stage is a room, 12 feet wide and 100 feet long, and provided with grills on the auditorium side, in which is the public address system. The stage is equipped with many microphones, and test microphones are in various parts of the auditorium, so that the intensity of sound may be properly adjusted in the control room above the auditorium ceiling. The operator of the system performs his duties from a desk in an 8 x 12 x 6-foot room that looks merely like an indentation in the ceiling. Cork lining allows him to get an accurate record of the sound volume in every part of the auditorium.

Courtesy of National Theatre Supply Co.

Above—The projection booth



Left—The orchestra lift



Below—Backstage view, showing curtains and rigging

Photographs above and right, courtesy of J. R. Clancy, Inc.

PLANNING SCHOOL BUILDINGS FOR USE OF VISUAL AIDS

By THOMAS J. HIGGINS

Assistant Director, Bureau of Research and Building Survey, Board of Education, Chicago, Ill.

VISUAL instruction is a type of instruction that quickly enables the student to survey the world in which he lives in a closer and more comprehensive way. When properly used, visual aids tend to arouse the interest of the pupil and promote active attention.

Visual instruction involves the use of many visual aids—school museums, classroom experiments, maps, graphs and charts, specimens and models, flat pictures, the stereopticon, the opaque projectors, film slide projectors, silent motion-picture projectors, and sound motion-picture projectors. The radio has taken its place as an important auditory device, and the sound motion picture is rapidly replacing the silent motion picture in schools, owing to the high quality of educational sound film material that can be obtained for effective use.

The main concern in providing school housing facilities for visual aids is to provide for stereopticon and motion picture projectors. The use of non-inflammable 16 mm film has eliminated the need for projecting-booths in most school auditoriums. A portable projector satisfactorily produces a picture of any desirable size from a distance up to 75 feet from the screen. It is considered good practice to have the width of the screen equal at least one-sixth of the distance from the screen to the back row of seats. The table on page 323 gives the different size pictures which can be obtained with motion-picture projectors from various distances with various lenses.

It is recommended in auditoriums that electrical outlets be provided both at the rear and midway in the center of the room. A separate electrical circuit

Social studies become a reality with visual instruction

MOTION PICTURE PROJECTORS 8 MM AND 16 MM FILM

LENS FOCAL LENGTH		DISTANCE IN FEET FROM SCREEN										
On 8 mm Proj.	16 mm Proj.	16′	20′	25′	32′	36′	40′	50′	64′	75′	100′	125′
		WIDTH OF PICTURE										
	¾″	8′0″	10′0″	12′6″	—	—	—	—	—	—	—	—
	1″	6′0″	7′6″	9′4″	11′11″	13′5″	14′11″	—	—	—	—	—
¾″	1½″	4′0″	5′0″	6′3″	8′0″	9′0″	10′0″	12′6″	—	—	—	—
1″	2″	3′0″	3′9″	4′8″	6′0″	6′9″	7′5″	9′4″	11′11″	14′0″	18′9″	23′5″
	2½″	2′4″	3′0″	3′9″	4′9″	5′4″	6′0″	7′6″	9′7″	11′3″	15′0″	19′8″
1½″	3″	2′0″	2′6″	3′1″	4′0″	4′6″	5′0″	6′3″	8′0″	9′4″	12′6″	15′7″
	3½″	1′8″	2′1″	2′8″	3′5″	3′10″	4′3″	5′4″	6′11″	8′0″	10′8″	13′4″
	4″	1′6″	1′10″	2′4″	3′0″	3′3″	3′9″	4′8″	6′0″	7′0″	9′4″	11′8″

Sizes of pictures which may be obtained with projectors from various distances with various lenses

of 1,000 watts should be provided for the use of the various projectors. The modern movie projector uses a 750-watt lamp; a stereopticon a 500-watt lamp; the 35-mm film slide projectors a 300-watt lamp. It is to be remembered that colored film requires more light than the black and white film.

Laboratory experiments take on new meaning with visual aids

It will be well to keep in mind the acoustical properties of an auditorium where sound projectors are to be used, avoiding the use of hard plaster walls and metal ceilings, unless acoustical correction material is planned to be used.

It would be well to provide two 1-inch conduits in the auditorium to carry a cable from the projector machine to the stage speaker and to carry the microphone cable as well, from the stage to the amplifier, so that activities on the stage can be amplified through the movie projector amplifier, eliminating the need of a public address system in the auditorium.

In most instances, the use of beaded screen is desirable. The farther back on the stage the screen can be erected, the better, so as to eliminate the maximum amount of distortion as viewed from side seats near the stage. No seats should be provided at angles greater than 45 degrees from the center of the screen. Beyond this angle distortion becomes too great.

Another desirable convenience is to provide a master switch for the electric lighting in the assembly hall near the projector outlets, so that the operator of the projector may also control the lighting of the auditorium.

It is desirable to darken the auditorium by window shades or draw-curtains. The modern projector is so efficient that it can be used in a rather light room; but of course, the darker the room, the clearer the picture.

A light portable stand about 42 inches high with a shelf below the top should be provided for the projector.

The increasing use of movie projectors and stereopticons in classrooms, in both elementary and high schools, dictates the policy of providing electric outlets for this purpose at the rear of each classroom. Again a separate circuit is recommended. It is hardly feasible to provide dark shades in all classrooms. However, it is desirable to provide dark shades in the science laboratories. Where these are required, a painted duck shade, painted light-buff to match other shades, has proved very satisfactory, and does not detract from the exterior appearance of the building.

Techniques in drawing developed with visual aids

DEMOCRACY AND SCHOOL DESKS

By HENRY EASTMAN BENNETT

THE rapid change from fixed to movable classroom seating is part of the whole democratic trend from rigid regimentation to individual freedom. It is of one piece with new methods of teaching and management, dedicated to the same high ideal of a greater measure of self-direction, and liable to the same dangerous result of too much self and too little direction. It contributes to pupil initiative, which may mean plenty of starting without much arriving. It favors spontaneity, which is sometimes mere spontaneous combustion instead of voluntary and consistent effort toward a worthy result. It facilitates flitting hither and yon, as well as going from here to there.

In short, there is no conceivable purpose which a pupil's school seat can serve which may not be served either better or worse by the fact of that seat's being movable, or adjustable, or anywise different from the now obsolescent rigid fixed desks. The large possibilities for good or bad of the flexible types of seating depend on the intelligence of designers and manufacturers in making them, and of teachers and pupils in using them.

Not All the Old Were Bad—Not All the New Are Good

In the traditional stationary "combination" desks which characterized American classrooms during most of the past century, there had evolved some approximation to comfort, design and rational proportions of the dimensions. Movable seating started with the idea of attaching a desk top to an ordinary adult chair, and there was nothing rational about the dimensions, proportions or design of the chair selected for experiment. Among the countless models of classroom movable desks and chairs inflicted upon the schools during the past 25 years, a large majority have been atrociously worse in these respects than any combination desk of which we have record. On the other hand, there are among them the most perfectly proportioned, posturally correct and hygienically right seating units that have ever been designed for school or any other purpose.

The old stationary desks had gravitated toward fair standards of graceful design, smooth finish and sanitary construction. It would be hard to imagine anything in the way of furniture more hideously awkward, clumsy and crude than some of the movable desks, tables and chairs which have replaced them in the schools. On the other hand, some of the recent models embody a modern streamlining and functional beauty worthy of any environment and expressing the highest ideals of commercial designing.

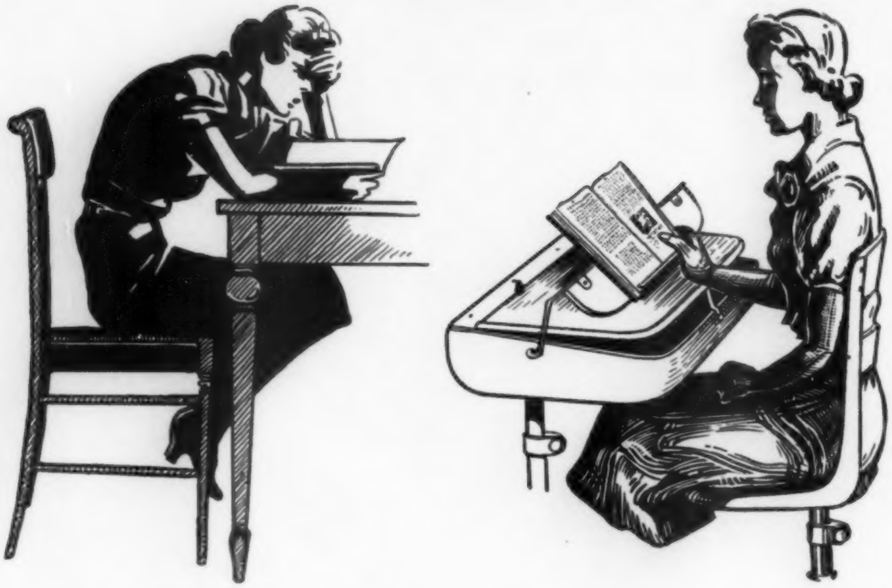
New Factors of Choice

Durability and economy were unquestionably the strong points of the obsolete fixed desks. Countless thousands of them are strong and sturdy after a half-century of hard use and have outlasted the buildings in which they were installed. Among the movable structures, many have been flimsy, short-lived and therefore expensive. Every imaginable sort of failure has occurred in materials, joints, screw attachments, swivels, hinges and adjustments. Through expensive experience, modern engineering, research and thorough scientific testing, the best manufacturers have overcome these frailties until the best new products give every promise of lasting as long as, or longer than, did their primitive predecessors. In thorough workmanship, fine finish and structural quality, it would be difficult to find anywhere or at any price products superior to the best movable units.

So narrow was the range of choice in the old type of desk, buyers tended to feel that they had no responsibility beyond securing the lowest price. The extreme range of variation in suitability and in use values of every kind which distinguish not only between the different types of movable seating equipment but between different models of the same type, now impose upon purchasers the responsibility for deciding upon many factors of choice, among which price becomes a minor consideration. At the same time, the very flexibility of the modern equipment imposes upon administrators, teachers, pupils and custodians new responsibilities for its proper use and care in proportion to the new uses, values and educational opportunities which it permits.

Space-Saving—Orderliness

In the matter of floor-space economy, the traditional straight-line arrangement of fixed desks is still considered by many administrators and architects as constituting the most economical arrangement of classroom seating, and a justification for the continuing use of the stationary in preference to movable seating. In comparison with some of the types and uses of movable furniture, this is obviously true. Nevertheless, the inflexible arrangement wastes from 25 to 40 per cent of the available floor space, under average conditions, in unoccupied and practically unusable rectangles at the front and sides of the room. In addition, there is the waste of space taken up by



Which shall it be—reckless waste in learning, or conservation of educational resources?

unoccupied immovable seats. Flexible equipment, when scientifically designed and utilized, permits an even greater number of pupils to be properly seated, the best-lighted portions of the rooms to be more effectively used, unoccupied seat space to be immediately available for other purposes, aisle and marginal space to be flexible and utilized for supplementary equipment and class activities.

By the formal-minded, the old type of seating was assumed to be the perfection of orderliness, and essential to training in that virtue. Some of the flexible equipment does defy Heaven's first law under any circumstances, and is certainly an effective tool for the breaking of that law by pupils who are so inclined. Yet, some of the most completely flexible seating equipment is incomparably more conducive to group orderliness and especially to the development of orderly habits than the obsolete types could possibly be. What has just been said about orderliness may be applied in detail to the smooth movement of class groups, genteel modes of entering or leaving a desk, absence of noise or other disturbance incident to the pupil's movements or to operation of the moving parts of the desk, and the keeping of the entire unit and the contents of his bookbox clean, neat and attractive. While nothing can be more effective than abundance of floor screws for keeping desks in straight rows (and few things are more irritating to some teachers than ragged rows), the most flexible equipment is susceptible to an unlimited variety of perfectly orderly uses. A detail rarely appreciated is that practically any movable seating equipped with good rubber shoes on the rear feet and glides on the front feet becomes practically immovable by the child while seated in it, yet is readily slidable on the front feet when not occupied. There is no more valid reason for furniture being stationary in the classroom than in the living room, but mere misused mobility may result in endless distraction, confusion and cluttering-up of any room.

Flexible Grouping

One of the potent arguments for the change from stationary to movable seating was the grouping idea. This is in recognition of the fact that some of the most effective learning is done by pupils in groups cooperatively. In the exigencies of flexible methods of teaching it is frequently desirable to conduct certain class drills and exercises with more or less isolated and variably segregated groups. Note that the mere formal division of a class into fixed sections is not grouping in the flexible sense and is in itself no argument against fixed seating. Flexible grouping is essentially temporary, almost momentary, and constantly varying in the size and personnel of the groups. Temporary groups may vary from two pupils to half the class or more. Nevertheless, it remains true that the sort of group which functions most in nearly all learning activities is either an individual pupil concentrating on his own study problem or an entire class or large section group being instructed by the teacher.

Any sort of equipment which in itself limits or fixes the size of the groups, or restricts the membership to pupils of the same physical size, thereby defeats not only the objectives of flexible grouping but also the more important requirements of either individual concentration or class group instruction. Yet, in the name of grouping, classrooms have been equipped with tables for two, four, six or eight pupils, which, in addition to numerous other objections, most effectively interferes with either flexible grouping, individual concentration or class unit activities. Furthermore, such equipment, though not mechanically stationary, is practically immovable, since its very size seriously limits the effective arrangements to which it can be adapted within the classroom. This is only one illustration, though a particularly obvious one, of the way in which spontaneous enthusiasm for doing something that will make a school less like a traditional school results in defeating the specific purposes

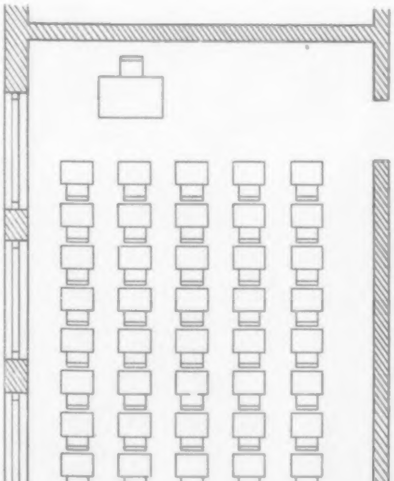
sought and in making the school less like what a school must be in order to be a school at all.

Sizes and Proportions of Seats and Pupils

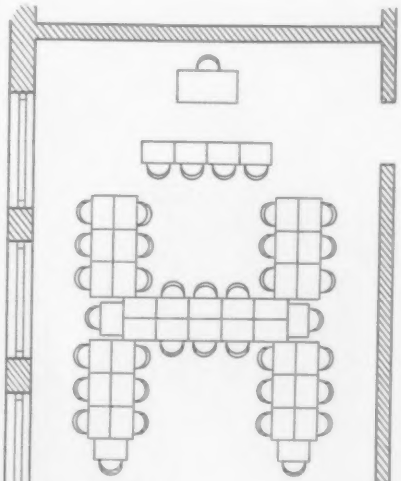
With respect to the proper adaptation of the sizes and proportions of seating furniture to the ever-varying sizes and proportions of school children, untold confusion and complications have arisen in the course of the transition from fixed to flexible seating. Certainly, the old combination desks were bad enough in these respects. Certainly, there is now available movable and adjustable equipment which meets every ideal of perfect adaptation to individual needs. Yet it may be safely asserted that since the days of primitive board benches there have never been so many pupils sitting in seats so high that their feet do not reach the floor, so long that their backs get no adequate support, so ill-designed that comfort or reasonably good posture are impossible, and so badly related to the desk surfaces that stoop and eye strain are inevitable. Even where there has been a zeal for "correct sizes," too frequently the result has been merely getting the legs of tables and chairs sawed off at a confusing multiplicity of heights. Frequently, administrators and physical supervisors have assumed that if either a "correct average" or a sufficient variety of seat heights is available in a classroom, every pupil's seat will "fit." In truth, an average is meaningless for any specific individual, and a large assortment usually results in many more wrong than right combinations.

As a matter of fact, precision in seat heights is a minor factor in correct seating and, provided only that the seat is not so high as to cause pressure in the popliteal area (behind the knees), no one can say that one height is necessarily better than another within a range of two or three inches. For a given pupil, the best height for comfort and good posture is more dependent upon the scientific form of the seat and back and upon the size and slope of the seat, than it is upon the inches from the floor. For example, adults are usually seated at the dining table on flat seats 18 inches high; at the theater on very comfortable seats which slope from about 16 inches to 13 inches; in most other comfortable chairs at 16 inches or 17 inches; and in luxurious lounging chairs the sitting point is often only 10 or 12 inches from the floor. Effectiveness in chairs for either wholesome posture or comfort is not a matter of *fit* but of *form*. A badly designed or improperly combined seat and back form cannot be right at any measure; a correctly designed unit may be equally satisfactory for individuals varying by several inches in stature or limb length.

The same principle of form rather than fit is no less true in respect to the relation between the seat and the desk top. There is no height, in relation either to the floor or to the chair, at which continued reading and writing done on a level surface is not conducive to stooped posture and eye strain. Bad posture is inevitable if such work is done with the seat spaced too far from any sort of working surface. On the other hand, while there are certain anatomically ideal standards in respect to the precise height of a sloped working surface from the seat, there may be a variation of an inch or more in either direction from such ideal position without any significant disadvantage which any intelligent analysis can designate. Certainly, any arbitrary rule as to the difference in height between the seat and the desk surface is



Tradition is usually half right



An acute case of spontaneity

For orderliness and sight conservation

necessarily incorrect, since individuals in any class or in any other kind of group vary constantly in their relative proportions. There is no constant relation between the leg measure which determines the seat height and the body length which determines, by whatever standard, the height which the desk should be above the seat.

Cleaning Around the Furniture—or Shifting It?

New types of equipment bring new responsibilities likewise to custodians and janitors. Indeed, the opposition of these has sometimes been a major factor in depriving schools of modern equipment on the assumption that new responsibilities necessarily mean more work. Traditional stationary equipment makes the thorough cleaning of classroom floors very difficult and laborious; so much so that it may safely be said that the floors of rooms so equipped are never thoroughly cleaned. Whether it is easier to clean around the stationary type or to shift the movable kind and clean the floor thoroughly, depends on the standards of cleaning and the difficulties involved in the moving. Some movable furniture is undoubtedly difficult to move and consequently floor cleaning is slighted. On the other hand, much modern seating equipment is so designed that with a little intelligent planning as to methods of handling, floors may be thoroughly cleaned with considerably less effort than was required to work around all the feet of the stationary type in even a superficial manner. Modern equipment also involves responsibility, though practically no labor, in keeping moving parts in proper adjustment.

Conservation of Eyesight

Probably the most serious responsibility as well as the greatest opportunity in connection with the introduction of flexible types of seating is related to the conservation of pupils' eyesight. The traditional seating, or any other arranged in the traditional lines parallel with the windows, necessarily subjects some 40 or 50 per cent of all the pupils in the classroom to harmful glare from the window areas within the range of vision as they work at their seats. Furthermore, the traditional position of the work on the desk top is conducive to eye strain and stooped posture for all pupils, and often reduces the effective daylight illumination at some of the desks to as little as one-tenth of that actually available. Among the new types of flexible equipment there are some which are so designed as to utilize the maximum illuminating efficiency of either natural or artificial lighting, and at the same time to encourage that posture and visual relation to the work which minimizes eye strain and all its attendant immediate and ultimate evils.

Yet, through heedlessness of established principles in the designing, but more especially in the use, of movable seating, children are sometimes subjected to conditions of visual strain far worse than would have been possible with stationary furniture. Crimes against the eyesight of pupils are daily committed in the name of flexible grouping and informality. And there are entailed no less criminal offenses against their general health, learning progress, and habits of mental independence and effective concentration. Pupils are permitted to sit facing directly into the light, working in their own shadows, and in other positions necessarily involving serious eye strain. The relations of seat and desk tops are often such as inevitably involve needless fatigue, restlessness, stooped posture and working inefficiency, as well as permanent impairment of vision.

Proper Seating—Properly Used

It is not within the purpose of this article to argue the advantages of modern movable seating in general or of any design of it in particular, nor to discuss the limitations beyond which those advantages are not valid. Those advantages must be weighed in relation to economies in school building and maintenance, to ultimate savings in cost of both equipment and janitor service, to more efficient administration, to greater effectiveness of modern teaching methods, to the most successful conditions for study and educational progress, to the conservation of pupils' vision and physical welfare, as well as to better training in habits of social activity and democratic forms of conduct.

There can be no turning back to the old nor wholesale rejection of the new because of mistakes in its development or use. Those who select it must take the responsibility of knowing its possibilities and limitations and the structural and design factors on which they depend. Those who use it must be taught and trained in the proper use of it until such use becomes as automatic as the pronunciation of a familiar word. Lessons learned in the modest realm of sitting and sedentary work at school should be so well learned as to be useful assets through life, as should other teachings of the schools.

Habits of sitting posture and of the use of the eyes are "bred in the bone" and in the muscles and in the nervous system of every individual. Wholesome habits of the kind are life-long contributions to greater efficiency, better health and increased worthwhileness and joy of living. Bad habits of the sort are a cruel burden and a needless penalty to pay for learning. The difference is a matter of the influence of seating on sitting and eye-work at school, and a responsibility of those who make it, those who select it and those who use it.

RADIO EQUIPMENT THAT IS RELATED TO SCHOOL USE

By WILLIAM B. LEVENSON

Supervisor of Radio Activities, Cleveland Public Schools, Cleveland, Ohio

FOR many centuries teaching was done largely by means of a teacher's voice. With the invention of the printing press greater emphasis was placed upon using the eyes, and wide reading was the gateway to scholarship. Today, sound has once more come into its own through the great influence of radio.

Radio teaching is no longer a novelty. Experimentation has shown that just as the radio sells merchandise, it can and does sell education. More than 30 colleges and universities from coast to coast own and operate radio stations. Schools and colleges find, more and more, that they must interpret their activities to the public and, as a result, the use of radio is increasing rapidly. Many high schools have established radio workshops, and write and produce their own programs. Recordings are being used increasingly in speech work and dramatics. Several school systems have already selected directors of radio activities and, as more trained persons are available, the number will increase.

Further evidence of the great interest in radio education is the action of the Federal Communications Commission in setting aside 25 channels in the ultra-high frequency band which are to be used for strictly educational purposes. At the present time, the Cleveland school station, WBOE, operating on a frequency of 42,500 kilocycles, is broadcasting educational material seven hours daily. Other school systems have applied to the FCC for permission to engage in a similar enterprise, and the growth of educational radio stations is more than probable, especially since the recent allocations for frequency modulation transmission.

The result of all this interest has been that school administrators are becoming more and more sound-minded. Not only are they paying more attention to the acoustics of the school building, but they also want to know more about the sound and recording equipment they can use. And so the purpose of this article is: How can the school radio equipment be

The Cleveland schoolteacher has as her assistant not only the visual aids, as presented through the projector, but authentic materials vividly given through the loudspeaker

The utilization of the radio program is perhaps more important than the program itself. This illustrates pupils engaging in follow-up work after they have heard a radio lesson in art

more definitely related to its probable function?

It should be stated at the outset that the best information as to school radio equipment is available from the Committee on Scientific Aids to Learning. Its various reports on recording equipment, radios, central sound systems, etc., should be in the hands of every school man contemplating the purchase of such material.

What School Radio Set to Buy

To recommend the purchase of radio sets these days is a delicate task because of the rapid development of frequency modulation. If the newer system is adopted generally,—and the number of FCC applications seems to indicate that it is not unlikely,—then the purchase of the conventional amplitude modulation receiver is perhaps unwise. Perhaps a safer procedure is to buy the combination AM–FM set so that more flexibility will be available. The factor of cost must be considered, however, and as the transition to this newer type of transmission will, according to best authorities, be a matter of several years, and as the investment is not very great, perhaps the purchase of inexpensive AM sets can be justified. The type of local transmission to be expected is another factor. In any event, the radio set for school use must be a flexible unit which is easily operated and generally portable, unless high fidelity reception is desired. It is true that as certain qualities are demanded, certain other qualities will be sacrificed.

The Use of Public Address Equipment

In dealing with central sound systems, however, one can be more specific. When every classroom in the school building is equipped with a loudspeaker, the principal and the teachers have added an important tool for teaching. Thus, among numerous possible uses, public address equipment is now being used to:

a. Distribute a radio or a recorded program in all, or selected, classrooms.

b. Provide effective publicity for school athletic events, concerts, and the like. (One principal indicates that within a short time he paid for the public address outfit by the increased attendance at school events.)

c. Furnish the principal with a device for making emergency administrative announcements to all pupils and teachers simultaneously.

d. Provide a loudspeaker system for athletic events in the gymnasium or the football field.

e. Give the classes in public speaking and dramatics an

opportunity to present their programs to the rest of the student body.

f. Relay an auditorium program into selected rooms. (In most schools the auditorium is too small to accommodate all the pupils at one time.)

g. Amplify the speaker's voice in any of the large rooms or auditoriums.

h. Aid in the installation of a sound motion picture unit.

i. Provide training for classes studying electricity (operation and maintenance).

j. Furnish music for school functions, dances, etc.

k. Distribute selected "master lessons" in other classes studying the same subject.

Of course, there are other educational uses of public address and related equipment, such as the talking book for teaching the blind, but the foregoing are suggestive of the fact that the modern school is "streamlining the learning process" with modern tools.

What to Include in an Installation

The needs of the public school regarding equipment are more or less unique because any installation will receive rough handling, the operators are generally immature, and the maintenance irregular. When the cautious school man looks at public address equipment, he generally will expect provisions for the following: radio, phonograph, microphone, sound pictures, and recording. He will consider in the unit provision for future expansion, whether more classrooms need to be added, etc. He will generally favor a multiple-channel arrangement in case simultaneous programs are desired. It is evident that the flexibility of the unit should depend upon the probable use that will be made of it. The machine itself, of course, has no inherent value.

If the purchaser of this school equipment can anticipate his future needs, he will probably ask for a turntable that can accommodate a 16-inch record and one that operates at both speeds, 78 and 33⅓ rpm. Of course, he will expect a reasonable degree of undistorted power, with several outlets in different locations which will allow for maximum utilization. He will want a unit that is simple in operation, so that the students can handle it. Certainly he will desire a system that can be serviced readily.

Of course, no attempt is made here to present exact specifications for central sound installations. As was indicated earlier, such technical evaluations have already been made, and they are in far more comprehensive form than this brief article will permit. The emphasis here will be not so much on the technical

One of the four studios in the Cleveland School Radio Station, WBOE

performance of the installation as on its location, a factor which has been overlooked in many institutions where the central sound system is being used. In fact, in many instances the limited use of the equipment is due not to its performance but rather to the manner of its placement within the school building. And this is not difficult to understand when one realizes that the location is suggested in most cases not by individuals who have used such equipment in actual classroom situations, but rather by engineers who are apt to think more of equipment performance than of utilization. Too often the writer has seen public address equipment poorly placed from the point of view of probable use because some technician saw slight acoustical advantages.

Placement of Installation

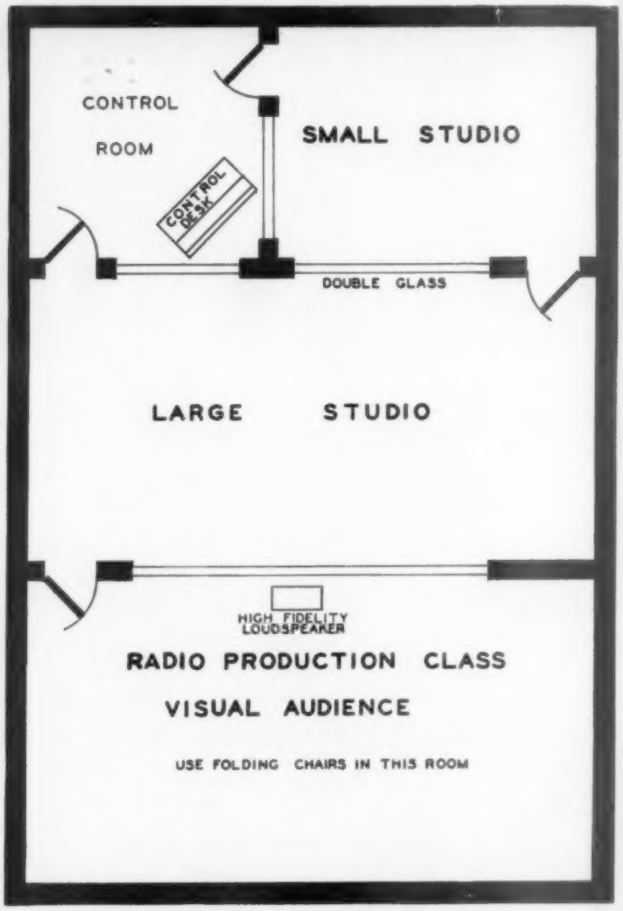
Now what is meant by poor placement? Consider an earlier form of installation. The panel was next to the principal's office, and all the rooms were equipped with loudspeakers. There were no microphone outlets. Each time the equipment was to be used, the principal's office was entered, and often the sound from the monitor disturbed his work. Generally the control room was so small that the size of the performing cast was decidedly limited.

It was readily apparent that this location was not satisfactory, and so several microphone outlets were added. But even then, when a program was being presented, the operation was always "blind." The performers had to work on "sound cues," and in general there was no localized control. But as other equipment was used later, such as portable mixers, even these difficulties were overcome. However, it was evident that, for smoother operation, a more centralized location was desirable. And so, as in a broadcasting studio, the panel was then placed in a visible control room adjoining a studio. From the radio production point of view, this functions quite well, the control is centralized, the performers can work on "sight cues," and various effects are easily handled.

The Radio Workshop

But, as the schools engaged more and more in radio activities, it was soon found that a typical broadcasting studio installation is not exactly what the schools need for their radio work. And the reason is that it is not suited for school workshop activities.

The development of the radio workshop in the progressive high school has been a recent and rapidly spreading development. Not only are programs produced, but other members of the class audit and evaluate group efforts. For the best results it is essential that the auditors or consumers of the program



Suggested layout for a school radio workshop

not only *hear* the program but *see* it as well. Only with a "visual audition room" can workshop activities be undertaken as they should. With the conventional studio set-up the auditors cannot see the production unless they all crowd into the control room. Or, if they remain in the studio and see the program, they cannot audit it properly. They lose sound perspectives, "board fades," and all the other elements that actually "make" the radio program. As a result of the experiences described above, and the probable practices in school radio, the writer recommends the location which appears at the top of this column.

The control room is arranged so that the director can be seen in either studio. The studios themselves are of different sizes so as to accommodate a variety of production units. Corridor doors are not shown, but they will be arranged to suit the individual building. The sound-insulating studio doors are located to provide ready access without limiting visibility. The chairs in the production class are of a portable type; and if funds are available, the floor can be elevated so that the auditors can readily see all studio operations.

PLANNING AND EQUIPPING THE ART ROOM IN A PUBLIC SCHOOL

By BERNICE V. SETZER

Director of Art Education, Des Moines Public Schools

AN ideal art room, suited to the needs and demands of a public school situation, is the dream of every art teacher. Since we in Des Moines believe that art is the expression of life's needs and interests through the suitable use of tools and materials in new and creative ways, we have tried to plan and equip the art rooms in the Des Moines public schools so that they are places where children can work together on their individual problems as well as on group problems. Above all, the art room should inspire and challenge children and teachers to a finer way of living in and out of school, making each individual more sensitive to all the materials with which he comes in contact in daily living.

Color

One of the most important factors, and one of the simplest to consider in the planning of an art room, is the color scheme. Of course, it should be light, cheerful, and pleasing to children. This can be accomplished by careful planning with those people who are responsible for the solving of that particular school problem.

Following are a few suggested color schemes which

Fig. 1—Movable tables and work-benches designed and manufactured in the factory owned and operated by the Independent School District of Des Moines, Iowa. Note the stools which can be placed under the bench or table when not needed. Also note cupboards in rear of room which were designed to meet a great need for storage space for materials and tools in an ordinary classroom not originally planned for an art room

Fig. 2 (above)—This tool cabinet gives children a definite feeling of respect for tools and their use

have proved most satisfactory.

A. Used in a dark half-basement room:

Walls—light lemon-yellow
Ceiling—light ivory
Wainscot—light turquoise-blue
Window sash—lemon-yellow with a little green in it
Radiators—same as wainscot
Lining in cupboards—turquoise
Wastebasket—turquoise

B. Used in a north room:

Walls—light yellow-peach
Ceiling—light ivory
Wainscot—light apple-green-grayed
Window sash—light apple-green
Radiators—same as wainscot
Lining in cupboards—peach
Wastebasket—apple-green-grayed

C. Used in a south room:

Walls—light yellow sea-foam green (made with light chrome)
Ceiling—light ivory
Wainscot—light mulberry
Window sash—yellow sea-foam green (deepened)
Radiators—same as wainscot
Lining in cupboards—same as sash color
Wastebasket—mulberry

Furniture

Does the art room invite children to come in and participate in some vital problem of their own? Is there a feeling of freedom of movement in the room where materials and tools are easily accessible to them? If so, the type of furniture is a very important consideration. We have found through several years

Fig. 3 (below)—This unit with the sliding bulletin board over the blackboard, the glass door cupboards which can be used for display cases, and the various-sized drawers for filing purposes, has proved very satisfactory

Fig. 4 (left)—A sink is a necessity in the art room but should be placed in the least conspicuous space in the room and still be easily accessible. The wet lockers are a boon to the art teacher who works with clay

Fig. 5 (right)—The electric jigsaw and drill press are great assets to the art room

of experimenting that a combination of work-benches with vises, and fairly large tables with drawers, using stools, instead of chairs, which can be pushed under the benches and tables when desired, is highly satisfactory. This type of furniture can be moved about to meet the individual needs as well as group needs of children. Such flexibility is conducive to a wider range of activities. (Fig. 1.)

Built-in Features

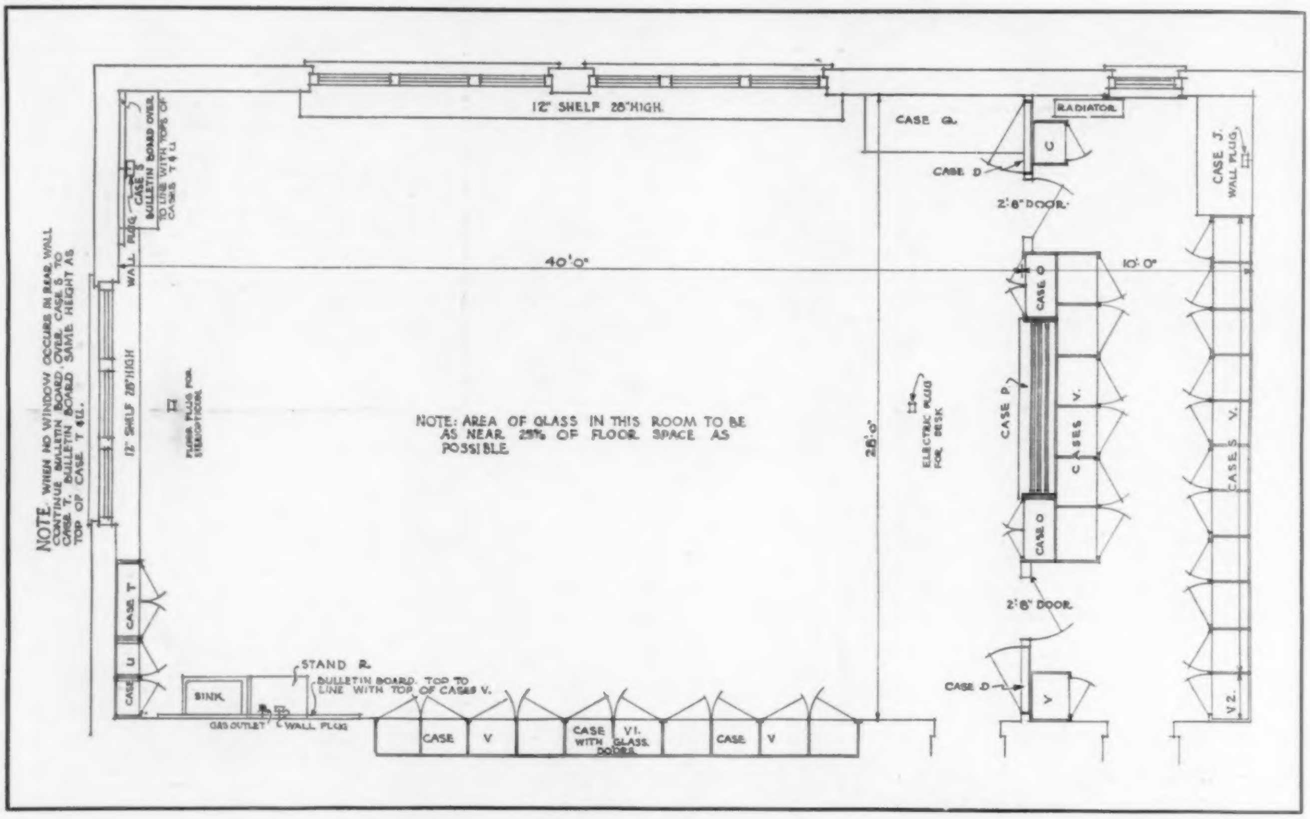
"To have a place and everything in its place" is essential in any art room. In our newer buildings, careful planning as to needs related to the program of art work in our schools resulted in having:

1. Excellent storage space for tools and materials and students' work. (Fig. 2.)
2. A large storeroom where the year's supply of materials and equipment for use in the art room can be kept; also, a coat closet for the teacher's use.
3. Display cases (glass doors). (Fig. 3.)
4. Filing space for reference material. (Fig. 3.)
5. Bulletin boards (cork); also sliding bulletin board over a blackboard (slate) in front of room. (Fig. 3.)
6. Sink with hot and cold water and paper towel holder. (Fig. 4.)
7. Wet locker for keeping clay modeling in good workable condition. (Fig. 4.)
8. Clay bin for storing moist clay.
9. Electrical outlets, conveniently located in different parts of the room.
10. Mount cases (built-in) for storing 22 x 28-inch mounts for exhibit purposes.

Equipment and Tools

We have all the usual types of equipment and materials, such as easels for painting, drawing-boards, etc., sewing machine, loom (table), small electric kiln, and an adequate supply of hand tools for working in wood, metal, clay, leather, textiles, bookbinding, etc.

Among the most popular pieces of equipment in



Plan of the typical art room which has been developed in Des Moines

the art room are two electrically operated tools: (1) a jigsaw complete with motor for sawing wood; and (2) a drill press, motor-driven, for boring holes in wood or for drilling holes in metal. These two pieces of equipment have been mounted on heavy tables designed and constructed in our furniture factory, owned and operated by the school board.

Floor Plan

The accompanying drawing gives the detailed plan for the typical art room which has been built for the specific needs of varied types of art activities in a public school. After several years of experimentation we have found that this type of art room satisfactorily meets the needs of our girls and boys.

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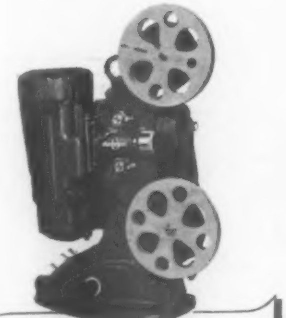

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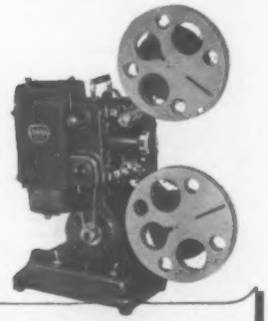

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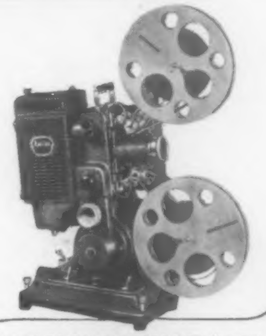

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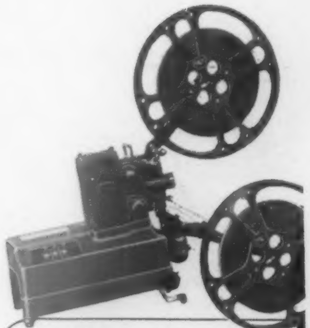

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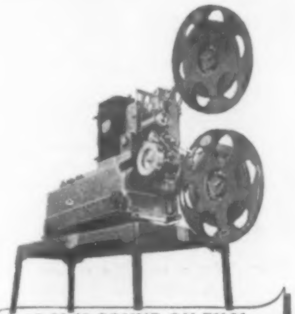

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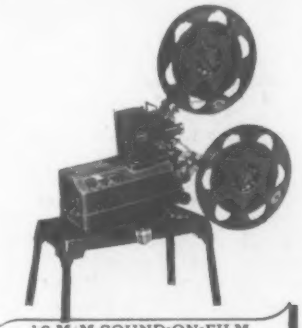

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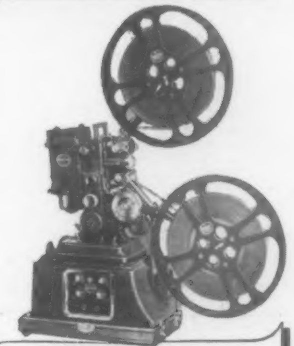

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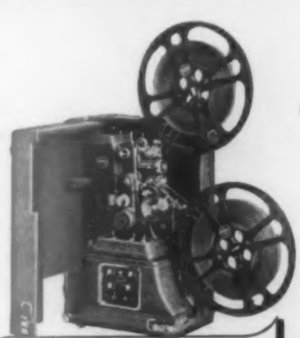

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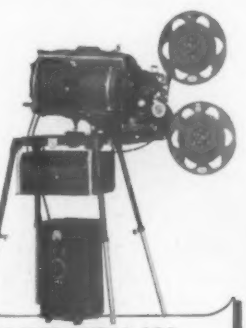

16 M/M AMPRO-ARC SOUND-ON-FILM MODEL "AA"
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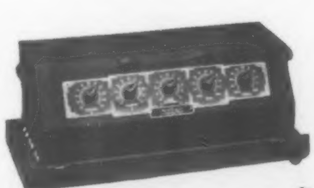

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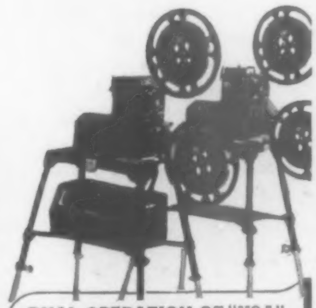

DUAL OPERATION OF "YSA" With TRI-PURPOSE AMPLIFIER
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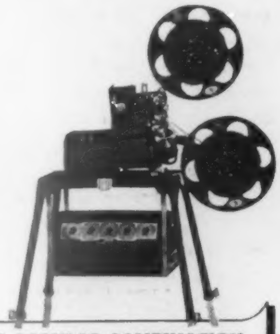

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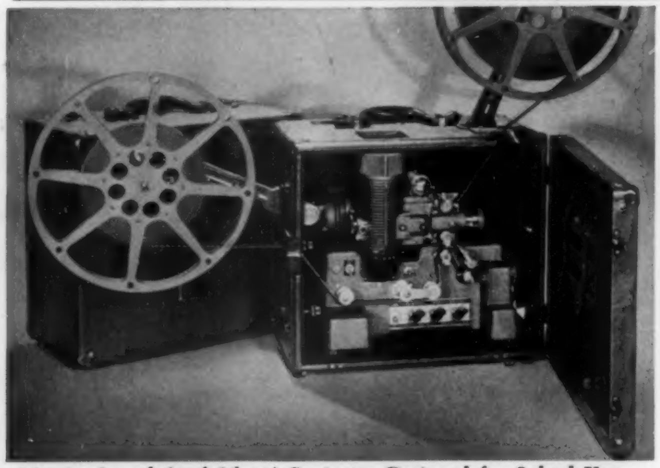

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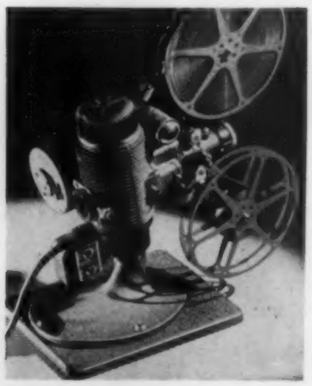

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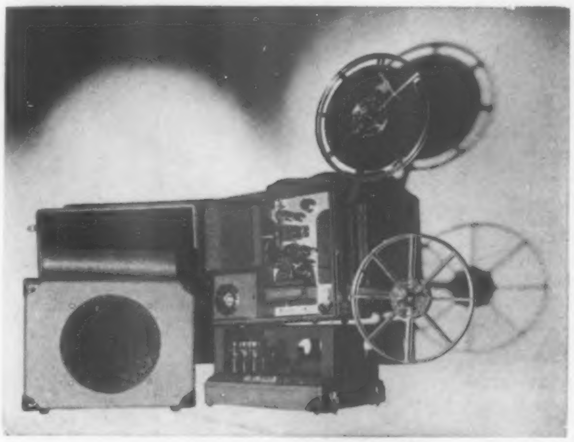

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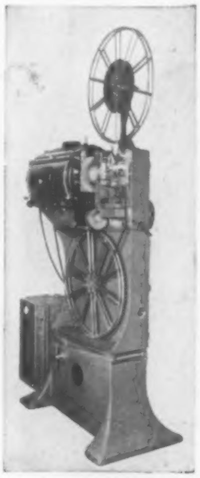

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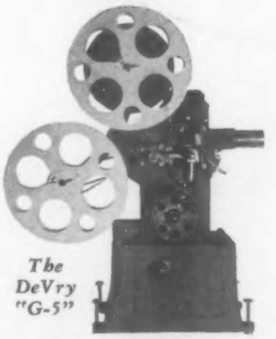

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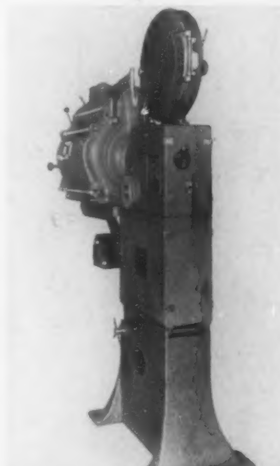

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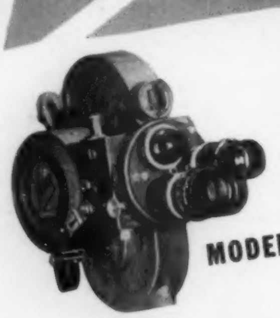

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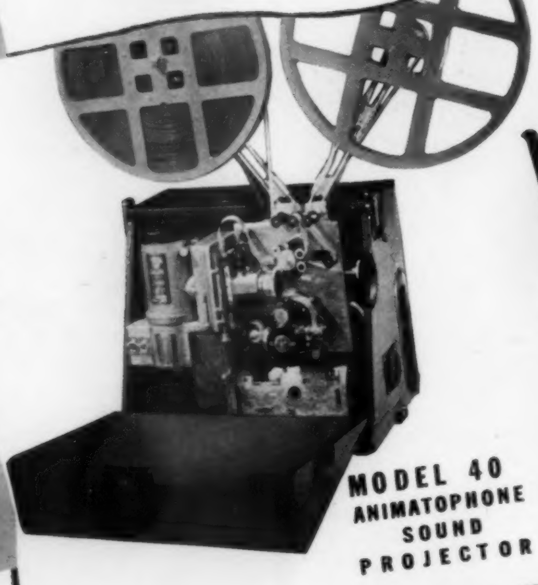

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PROJECTOR

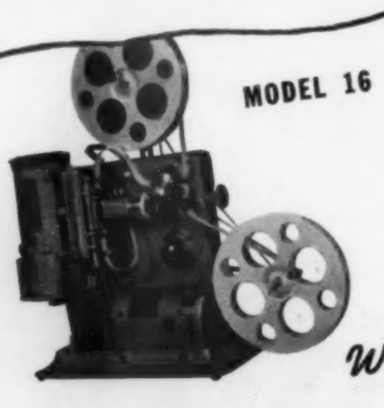
VICTOR ANIMATOPHONE

For silent or sound, black and white or color, motion or still picture projection. Complete with built-in amplifier (5-8 or 15 watts output). Attachment jacks for speakers, microphone, and phono record turntable.

Equipped with controls for Volume, Tone and Photo-cell voltage.

For 16 frame silent or 24 frame sound with governed operating speeds. Safety shutter for still pictures. Will handle 100 to 1600 feet of film with rapid motor driven rewind.

$275 and up



MODEL 16

VICTOR "SILENT 16" PROJECTOR

Film capacity up to 400 feet 16 mm. Direct lumination furnished by 750 or 1000 Watt lamp. Lens—2 in. F1.6. All focal lengths interchangeable. Victor-G.E. fractional H.P. motor with variable rheostat speed control (no brakes). Equipped with lamp, reverse and motor switches—pilot light. Tilt and Motor rewind. Guaranteed for 2 years.

$125 and up

Write for Complete descriptive literature

DA-LITE SCREEN CO., INC.

Dept. 41 A. U., 2723 North Crawford Ave., Chicago, Illinois

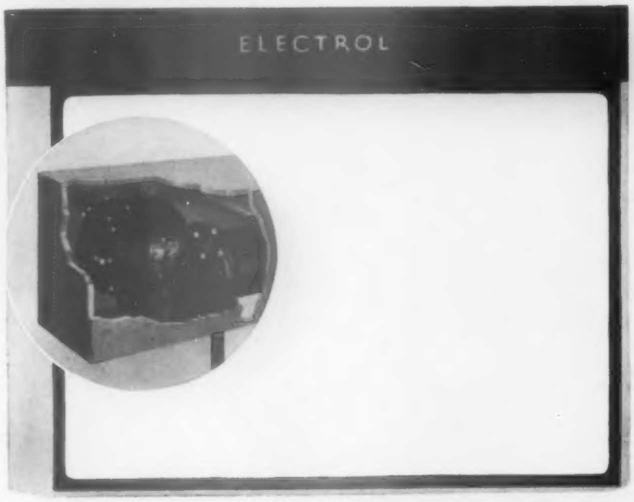
THE

DA-LITE

Reg. U. S. Pat. Off.

CHALLENGER SCREEN

Can Be Set Up Anywhere in 15 Seconds



This portable model combines superior light reflective qualities with unmatched convenience. It consists of screen, case and tripod in one unit. It can be quickly set up and is the only screen that can be adjusted in height merely by releasing a spring latch and raising the extension rod. The surface is Da-Lite's famous Glass-Beaded fabric which reflects maximum light without sparkle or glare. 12 sizes from 30" x 40" to 70" x 94".

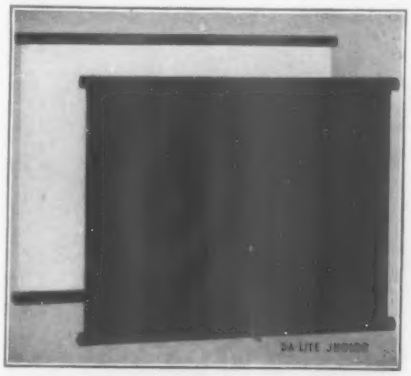
THE DA-LITE ELECTROL

Electrically Operated Hanging Screen

This convenient screen for auditoriums and large classrooms is a completely assembled unit with screen, motor and gear drive housed in a sturdy case. The screen can be raised or lowered electrically by remote control switch placed at any desired location. Sizes up to 20 ft. x 20 ft. with either the Da-Lite Glass Beaded or Mat White Surface.

DA-LITE JUNIOR MODEL

This screen has the same efficient Glass-Beaded fabric as the highest priced Da-Lite model. It can be hung against a wall or set up on a table. Four sizes from 13" x 18" to 30" x 40".



DA-LITE MODEL D

The Da-Lite Glass-Beaded Screen is housed in a leatherette covered box. It is spring-roller-mounted with a single telescoping rear support to hold the screen in position for showing pictures. 10 sizes from 22" x 30" to 72" x 96".

DA-LITE MODEL B

This spring-operated model is housed in a protective metal case and may be hung against the wall or from the ceiling or from a pair of Da-Lite Super Tripods. 12 sizes from 22" x 30" to 63" x 84".

Write for latest catalog and name of nearest supplier!

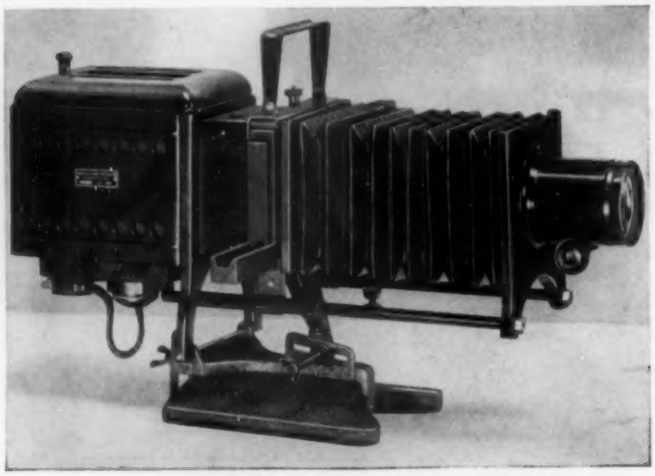
DA-LITE SCREENS

Famous for Quality for 32 Years

BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester, N. Y.

New York Chicago Boston Los Angeles
London, England Toronto, Canada San Francisco



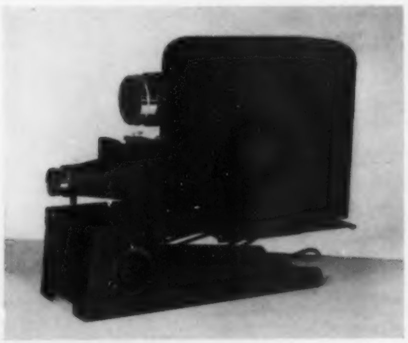
BDT BALOPTICON—For Slides Only

This extremely popular model is inexpensive, sturdy in construction, compact, easily portable and highly efficient. Its optical system is of exceptionally high quality and (depending on the lamp and lens used) can be used at distances from 4 to 80 feet from the screen. Image sizes range up to as large as 10 feet on the longer side. Maximum illumination. Extremely simple to operate. Still film, micro-projector and overhead projector attachments are available. The sturdy, tilting base is adjustable in two meridians and permits leveling the Balopticon even when placed on an uneven surface. This mounting allows for changing the projection angle for screen at various heights.

Model B is the same instrument as the BDT but without the tilting base. It is recommended for use where a permanent installation is being made, although it is readily portable.

LRM AND ERM BALOPTICONS FOR OPAQUE OBJECTS AND LANTERN SLIDES

The new ERM and LRM Balopticons for lantern slides and opaque objects give brilliantly sharp screen images under actual classroom conditions. An improved Built-In Blower-Cooling System safeguards efficiently objects being projected. The improved object holder is entirely free from interfering obstructions and permits projection of 6" x 6⅜" areas of large maps, drawings or photographs. The door is arranged for convenience in placing solid objects in the projection area.



SEND FOR CATALOGS

Catalog E-11, "Balopticons and Accessories," completely describes our line of Balopticons, many of which were omitted here due to lack of space. Micro-Projectors for school and college use are the subjects for Catalog E-20. For informative on Bausch & Lomb Microscopes and Spectographs see page 506 of this book.

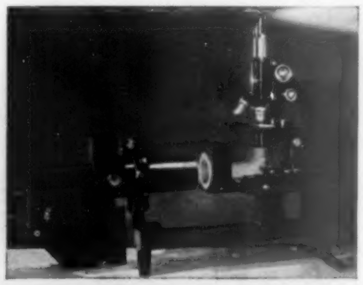
B&L 2" X 2" SLIDE PROJECTOR

Manufactured to the high standards of performance that characterize all Bausch & Lomb projection equipment, the performance of the B&L 2" x 2" Slide Projector is characterized by brilliant, crisp, sharply defined screen images plus comfort, safety and convenience in operation. Shows black and white or color transparencies. An ideal instrument for showing slides made by the instructor or by the students themselves.

This projector is substantially made and is fitted with a high efficiency Bausch & Lomb optical system. This consists of a 150 watt, single contact base bulb with a silvered, concave reflector, a triple lens condenser, one lens of which is special heat absorbing, and a five-inch f: 3.8 B&L Cinephor Projection Lens of the same type as used in professional motion picture projectors. Slide carrier permits use of cardboard, metal or glass mounted slides.

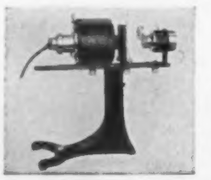
MODEL B MICRO-PROJECTOR

Now Bausch & Lomb offers a new Micro-Projector at a new low price. Any standard compound microscope can be used.



Simply place the microscope on the stage of the projector in an upright position, apply the prism reflector cap to the microscope and focus the illuminator. Complete directions accompany each projector.

Investigate this new instrument before completing your plans for science laboratory development.



TRIPLE-PURPOSE MICRO-PROJECTOR

Especially designed and priced for high schools, this extremely efficient unit serves three definite purposes—(1) projection of permanently mounted specimens on a screen from 4 to 15 feet away. (2) making drawings of microscopic fields. (3) projection of living specimens in liquids. Exceptionally sturdy in construction. Has both coarse and fine focusing adjustment. A two-power projection lens is included.

BALOPTICON TABLE

The B&L Balopticon Table provides a means of placing a Balopticon where it can be used to best advantage. It is portable (rollers on two front legs), and has a shelf underneath for slide boxes.

SPENCER LENS COMPANY

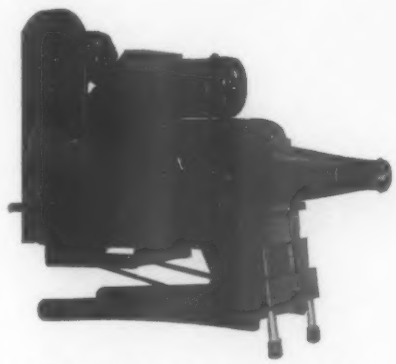
Buffalo, New York

Manufacturers of

Microscopes—Microtomes—Optical Measuring Instruments Delineascopes—Photomicrographic Cameras

BRANCH OFFICES

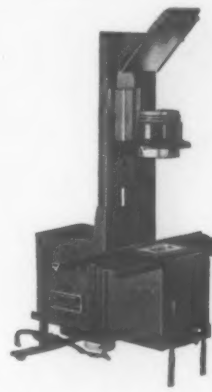
New York . Chicago . Washington . Boston . San Francisco . Los Angeles . Dallas . Columbus . St. Louis . Philadelphia . Atlanta



COMBINATION CLASSROOM DELINEASCOPE

This Model VA Delineascope projects both lantern slides and opaque objects. It projects postcards, photographs, drawings, pages in books, mineral and biological specimens. The back of the instrument is open so that illustrations in books of large size may be projected. An improved elevating device facilitates centering the picture on the screen. Furnished with or without cooling fan. A filmslide attachment may be added.

Model V Delineascope is available for opaque projection only.



SCIENCE DELINEASCOPE

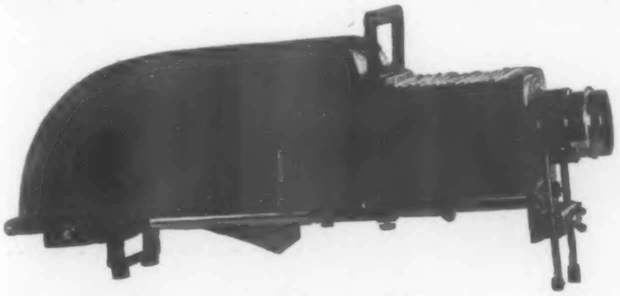
Spencer Model B is designed for lecture table use and projects glass slides, materials in Petrie Dishes or other transparent objects from a horizontal platform. Numerous scientific experiments such as magnetic lines of force, surface tension, mechanics, electrolysis, etc., can be effectively dramatized by projection to the entire class. This eliminates large, cumbersome and often expensive experiment set-ups.

The action of drawing or writing with a pencil on a ground glass slide can be projected. The shadow of any small pointer may be projected on the screen which is above and behind the lecturer.

DELINEASCOPE (for 2″ x 2″ slides)

Available as 300-watt, 200-watt or 100-watt instruments, this moderate priced group of Spencer Delineascopes (Models MK, MK-2 and MK-3) is noted for an extraordinary brilliance of screen illumination. Film safety is assured by a well ventilated lamphouse and, in the more powerful models, by heat absorbing glass and a fan cooling unit.

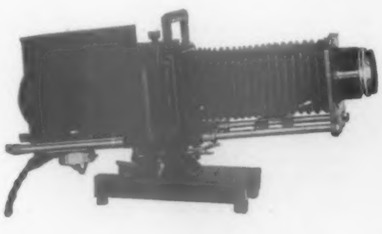
The MK-2 may be converted into a 300-watt model at any time by the addition of the fan cooling unit and a 300-watt bulb. The slide temperature in the 300-watt model is lower than in any other instrument for this type providing such brilliance of illumination.



NEW AUDITORIUM COLOR SLIDE DELINEASCOPE

Details and colors can now be brought to the projection screen in lifelike clarity and vividness with this new 750 watt Spencer Delineascope.

It accommodates both 2″ x 2″ and 3¼″ x 4″ slides and projects a more brilliant image either size than has formerly been obtainable with the average 1000 watt slide projector. An ingenious cooling system provides complete protection against film damage.



CLASSROOM DELINEASCOPE

Spencer Model D, for the projection of glass slides in classroom work, embodies several special features for the convenience of the teacher. It has a non-heat conducting carrying handle; a tilting and elevating device for conveniently locating the picture on the screen; an aperture in the side of the lamphouse to illuminate manuscripts; special optical system to insure remarkably sharp, brilliant pictures. Sturdy, lightweight and extremely portable.

FOR SPENCER MICROSCOPES SEE PAGE 507

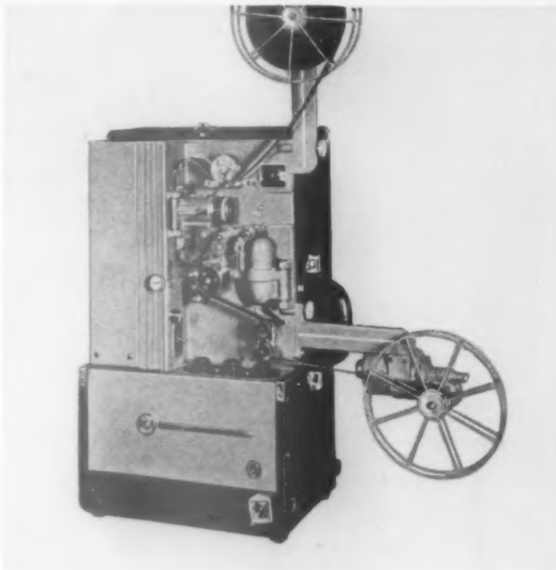
WRITE DEPT. P13 FOR COMPLETE DETAILS ON SPENCER DELINEASCOPES

RCA Victor

AUDIO-VISUAL SERVICE FOR SCHOOLS

THIRTY YEARS AGO the Victor Talking Machine Company established an Educational Department, designed to bring schools the benefits of recorded aids to instruction.

Since that time the tremendous advances in electronic engineering, many of them from the Laboratories of RCA Victor, have placed at the disposal of schools a vast number of additional teaching aids that have since become "standard." In this catalog we have made every effort to show not only the new types and models of equipment, but also the *applications* of those instruments to make your efforts more productive, more enjoyable.



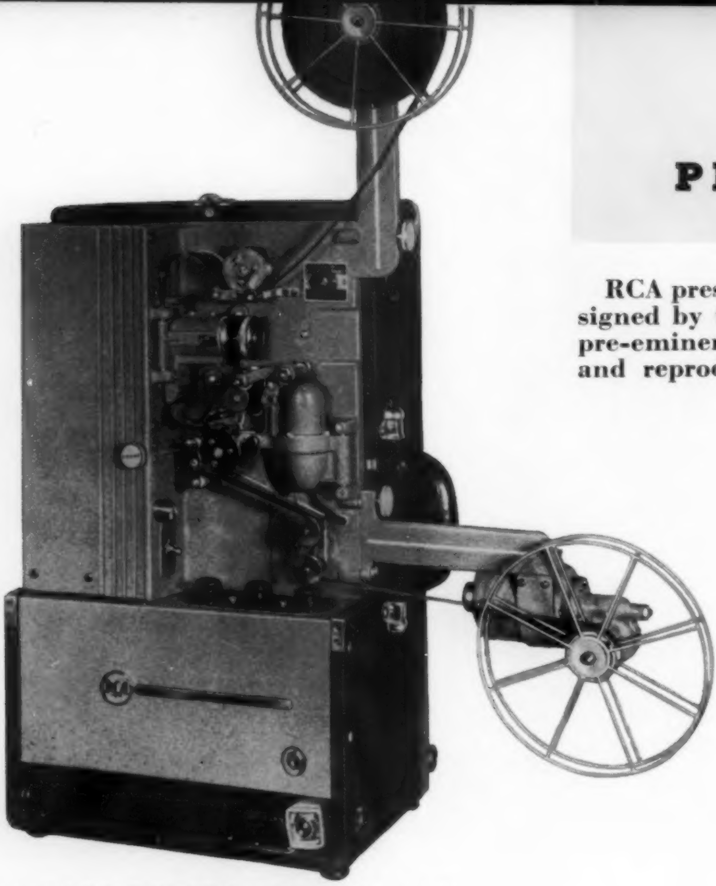
Obviously it is impossible to present here any *one* system or *combination* of units which would be "best" for *all* schools. However, the range of RCA Victor equipment for schools is so complete, so flexible, that there *is* a proper combination to meet the special requirements of any school.

It is here that the widespread facilities of RCA Victor are of invaluable assistance to you. For, RCA engineers are as close to you as the nearest RCA Victor District Office or RCA Victor Distributor. The experience of these engineers and of the Educational Department, are at your disposal in the selection of the proper equipment to solve the sound problems of *your* school.

We invite your inquiries, whether they concern the Master Control Sound Systems, Recording Apparatus, Victrolas, Victor Records, 16 MM Sound Motion Picture Projectors, Laboratory Apparatus or other types of audio-visual equipment. We offer you the benefits of a specialized knowledge gained from thirty years of experience in developing sound equipment and related sound and visual aids to instruction in schools of all sizes.

Inquiries addressed to the Educational Department, RCA Manufacturing Company, Inc., Camden, New Jersey, will receive prompt attention.

RCA 16MM. SOUND MOTION PICTURE PROJECTOR



RCA presents a 16 mm. Sound Motion Picture Projector designed by the same RCA engineers who for years have been pre-eminent in the production of high quality film recording and reproducing equipment for theatrical use. This RCA projector incorporates the latest developments and improvements in sound-on-film reproduction, including many exclusive features. For classroom or auditorium use, you will find this projector unexcelled in ease of operation, brilliant projection, and clear, life-like sound. Use the card on page 11 to request a copy of the new catalog. A demonstration will be arranged if requested.

EXTREME PORTABILITY—with projector case designed for easy carrying—projector case weighs 39 pounds, speaker case 28 pounds, fully equipped.

FEATURES

1 BRILLIANT PROJECTION—using specially designed optical system and large objective lens (f.1.65) providing more even screen illumination with 750- or 1,000-watt lamp.

2 RCA PHOTOPHONE SOUND with a maximum of 10 watts push-pull amplification—sufficient volume for classroom or average auditorium.

3 SIMPLIFIED THREADING—as easy to thread as a silent projector and made more simple by casting the threading line on the projector block.

4 THEATRICAL FRAMING—new type double-claw intermittent eliminates up and down movement of picture area on screen. Keeps film in center of most efficient light. No change of projector position while framing.

5 EFFICIENT COOLING—specially designed blower scroll cools lamp, amplifier and aperture gate. Lamp house barely warm while in operation. Life of lamp increased. Lamp may be removed quickly and easily.

6 MOTOR TAKE-UP AND REWIND—separate motor eliminates spring belts and assures equal tension on 400, 800, 1,200 and 1,600 foot reels. Simple and rapid rewind of all sizes of reels.

7 SHOCK PROOF STABILIZER—between take-up reel and lower sprocket, greatly reduces magnitude of jerks, uneven pull, etc.

8 SOUND OPTICAL UNITS—mounted on single casting for rigidity, with swinging bracket for easy cleaning of optical units and quick change of exciter lamp.

9 STABILIZED SOUND—using sound drum stabilized by large solid flywheel, with complete assembly running in shielded ball bearings.

10 ELECTRO-DYNAMIC SPEAKER—providing best balanced reproduction of speech and music.

11 EASY CLEANING—of aperture gate, condenser lens and reflector, to provide most efficient operation at all times.

12 TWO-SPEED OPERATION—at 24 frames for sound and 16 frames for silent films, with governor controlled motor and toggle switch for changeover.

13 EASE OF OPERATION—controls centrally located.

14 ONE POINT LUBRICATION—on high speed parts. Permanently lubricated journals throughout.

15 INPUT JACK—for using high impedance microphone or Victrola Attachment with magnetic or crystal pick-up. Speech input may be used with either sound or silent films.

16 STANDARDIZED LAMPS—pre-focused base projection and exciter lamps available anywhere at standard prices.

17 VARIABLE TONE CONTROL—providing the best reproduction of both speech and music.

ACCESSORIES

A complete assortment of accessories to be used with the RCA 16 mm. Sound Motion Picture Projector may be obtained through the RCA Victor distributors who demonstrate and sell this equipment. These accessories include various sizes of projection lamps, screens, rewind and patching equipment, etc. Many items of supplementary equipment are also available for use with the projector, such as RCA Microphones and Record Players.

Send for your free copy of the booklet illustrating the RCA 16 mm. Sound Motion Picture Projector and accessories. Use the card on page 11.

PG-114

RCA's 25-WATT PORTABLE

SOUND SYSTEM

For Audiences up to 3500 Persons

The RCA Portable Sound System Model PG-114B is a complete self-contained system consisting of a powerful 25-watt Amplifier, an RCA Junior Velocity Microphone with an adjustable floor stand and two large Permanent Magnet Field Dynamic Loudspeakers. The complete equipment, including all Inter-connecting Cables and Tubes, is housed in two sturdy black leatherette covered carrying cases—ready for instant service.

PG-114B (MI-12212/12400) Code SHUBY. *Complete with tubes but less Remote Control Unit.* **$299.50**

REMOTE CONTROL UNIT MI-4123A, Code SCUSJ. *With 30 ft. cable and plug. . . . .* **$18.75**

- **25 WATTS OUTPUT NORMAL**
- **REMOTE ELECTRIC MIXING**
- **RCA VELOCITY MICROPHONE**
- **FOUR INPUTS—TWO MICROPHONE—TWO PHONOGRAPH**
- **AUTOMATIC PHONOGRAPH COMPENSATION**
- **BASS AND TREBLE CONTROL**
- **110-VOLT AC, 60-CYCLE OPERATION**

The Old Way

Remote Electric Mixing

The addition of MI-4123A Portable Mixer with 30 ft. cable and plug permits remote control of PG-114B. MI-4685, 50 ft. Remote control extension cables with plugs may be used as required; or for extreme distances, up to 2000 ft., MI-45 five conductor remote control cable is available in required lengths.

MI-4685 50 ft. Extension Cable with Plugs, Code SCUWN $11.60

MI-45 Remote Control Cable, Code SCYFT $0.18 Ft.

The New Way

Lightens Administrative Burdens Increases Efficiency of Teaching Enriches the School Curriculum

EITHER of these two RCA Victor Master Control Sound Systems offers the principal a modern method of handling the ever increasing administrative duties of a school. They not only make it easier, more enjoyable to run the school, but also increase the efficiency of teaching through the school. They add to the joy of study by enriching the curriculum.

As an example, either of the RCA Victor Master Control Sound Systems enables the principal or superintendent to make simultaneous announcements to any or all parts of the school building or grounds without leaving his office. It permits him to communicate with any or all teachers by merely throwing the proper switch and speaking into the microphone located either at his desk or in a separate control room connected with his office. Fire drills; first aid; emergencies; checking of attendance or punctuality; health or general programs; controlled tests—all can be handled with a minimum of effort by the busy executive.

GENERAL SCHOOL ACTIVITIES

Record (or radio) programs in auditorium

—

Music program by school band, orchestra, records

—

Marching records

—

Background music for assembly

—

Records for dancing class

—

Broadcasts of significant public events

—

Sound effects for plays

EXTRA CURRICULAR ACTIVITIES

Announcing outdoor athletic events

—

Exercises on school grounds

—

Stage sound effects

—

Coaching of dramatics

—

Commentary on indoor sports events

—

Visiting lecturers and speakers

—

P.T.A. meetings

—

School dances and socials

GENERAL ADMINISTRATIVE USES

Announcements

—

Communication

—

Emergencies

—

Discipline

—

Program System

—

Increased Efficiency

—

Student Training

—

Controlled Testing

—

Safety Campaigns

CLASSROOM INSTRUCTION

By means of Radio and Phonograph:

—

Musical programs

—

Social Science programs

—

Current Events

—

Foreign Language Study

—

Music Appreciation

—

Special Programs

—

Physical Education

—

Speech Training

SOUND SYSTEMS

RCA VICTOR DE LUXE SYSTEM

The heart of the RCA Victor De Luxe Master Control Sound System is the master control console. Whether for classroom, auditorium, cafeteria, music appreciation room or outdoor locations, all broadcasts, announcements, radio programs or record programs clear through the master control. Located in the principal's office or in an adjoining room, it enables him to exercise control over the entire school. This De Luxe Model is designed for service to schools requiring from 20 to 120 speakers. Loudspeakers can be controlled individually or all speakers can be utilized at the same time through the simple operation of the master switch. Included in the cabinet are *two* radio receivers, permitting simultaneous reception of *two* radio programs which can be transmitted over separate circuits to different classrooms or groups of classrooms.

Included also is an automatic record player providing continuous programs of recorded music. Standard 16-inch electrical transcriptions can be played through the system by the use of the turn-table shown on page 7.

All-electric bells can also be transmitted through this control panel.

ADDITIONAL FEATURES

New console desk-type control with multiple program facilities. • RCA Victor gentle-action automatic record-playing mechanism plays eight 10" or seven 12" records • Electric Clock • Visual volume indicator • Microphone pick-up at central control location and other points desired, with provisions for remote volume control from all locations • Two separate programs may be transmitted simultaneously through selected channels with an additional channel available for communications • Equipped for attaching RCA Victor Recording Attachment • Recording Attachment provides for instantaneous recording of speech and music • Beautiful walnut finish cabinet • Dimensions: W. 55", H. 44½", D. 26". • Net weight 250 lbs.

RCA VICTOR JUNIOR SYSTEM

The RCA Victor Junior Master-Control Sound System is especially designed for installation in schools with 10 to 40 rooms. It has a 12-tube High Fidelity radio receiver with Electric Tuning for 8 stations, a Victrola which accommodates 10- or 12-inch records and a microphone for making announcements to and communicating with various rooms.

ADDITIONAL FEATURES

Provision for remote volume control, particularly important for auditorium use. • TUNING RANGE OF RADIO: 540-1720 kcs.—49, 31, 25 and 19-meter bands, each on individual Super-Band-Spreader dial strips for ease of tuning • VICTROLA: With feather-touch crystal pick-up, true-tracking tone arm and constant speed motor • CABINET: Fine heart and butt walnut veneers combine to provide a most distinctive piece of furniture • SIZE: 42 inches long, 18¾ inches high and 14¾ inches deep.

TYPICAL MASTER CONTROL INSTALLATIONS

RCA Master Control Units provide almost unlimited flexibility and economy in meeting the requirements of large or small installations with standard equipment.

A few typical systems are suggested below:

JUNIOR SINGLE PROGRAM

10 SPEAKER MASTER CONTROL SYSTEM

A single program system for a small school. Provides radio, phonograph and microphone programs for 10 average size rooms.

TYPICAL EQUIPMENT

QUANTITY	CAT. NO.	DESCRIPTION
1	MI-6718	Junior Master Control.
1	MI-6226D	Aerodynamic Microphone.
1	MI-6227	Microphone Table Stand.
10	MI-6248B	8″ Permanent Field Dynamic Speaker Mechanisms.
10	MI-6292	Sloping Front Wood Speaker Housings.

Price **$493.60** Equipment Only Including Tubes

JUNIOR SINGLE PROGRAM

20 SPEAKER MASTER CONTROL SYSTEM

A single program system for medium size schools. Provides radio, phonograph and microphone programs for 18 average size rooms and one auditorium, gymnasium, cafeteria or recreation hall.

TYPICAL EQUIPMENT

QUANTITY	CAT. NO.	DESCRIPTION
1	MI-6718	Junior Master Control.
1	MI-6226D	Aerodynamic Microphone.
1	MI-6227	Microphone Table Stand.
18	MI-6248B	8″ Permanent Magnet Field Speaker Mechanisms.
18	MI-6296	8″ Metal Speaker Housings.
2	MI-6247A	12″ Permanent Field Dynamic Speaker Mechanisms.
2	MI-6294	Sloping Front Wood Speaker Housings.

Price **$659.70** Equipment Only Including Tubes

DE LUXE TWO-PROGRAM

20 SPEAKER MASTER CONTROL SYSTEM

A two-program system. Provides two program channels for radio, phonograph or microphone and a separate communication channel. Ideal for any school.

TYPICAL EQUIPMENT

QUANTITY	CAT. NO.	DESCRIPTION
1	MI-6719	De Luxe Master Control.
1	MI-6226D	Aerodynamic Microphone.
1	MI-6227	Microphone Table Stand.
20	MI-6248B	8″ Permanent Field Dynamic Speaker Mechanisms.
20	MI-6292	8″ Sloping Front Wood Speaker Housings.

Price **$1189.60** Equipment Only Including Tubes

DE LUXE TWO-PROGRAM

50 SPEAKER MASTER CONTROL SYSTEM

Provides two-program channels for radio, phonograph or microphone and a separate communication channel.

TYPICAL EQUIPMENT

QUANTITY	CAT. NO.	DESCRIPTION
1	MI-6719	Master Control (with 50 Keys).
1	MI-6226D	Aerodynamic Microphone.
1	MI-6227	Microphone Table Stand.
2	MI-12211	Power Amplifiers.
48	MI-6248B	8″ Permanent Field Dynamic Speaker Mechanisms.
48	MI-6292	8″ Sloping Front Wood Speaker Housings.
2	MI-6247A	12″ Permanent Field Dynamic Speaker Mechanisms.
2	MI-4428	Wood Directional Speaker Baffles.

Price **$1878.90** Equipment Only Including Tubes

RCA RECORD PLAYERS AND ACCESSORIES

VICTOR SKATING RECORDS

35884 My Treasure—Waltz
La Spagnola
35927 Blue Danube Waltz
Wedding Dance—Waltz
36005 Espanita—Waltz
La Serenata—Waltz
36007 Luxembourg Waltz
The Merry Widow Waltz
35798 The Skaters—Waltz
Estudiantina—Waltz
36003 Sari Waltz
Waltz Dreem
24487 Waltz Medley
24472 Song of the Islands
Waltz You Saved for Me

VICTOR CARILLON AND CHIMES RECORDS

20629 Impression of London
St. Margaret's Chimes Westminster
24552 Chimes from Tower of Monastery
Church of Arch Abbey at Beuron
20993 Christmas Bells
Deck and Hall
26079 O Little Town of Bethlehem
Adeste Fideles (Oh Come, All Ye Faithful)

VICTOR CHIMES WITH VIBRAHARP RECORDS

25669 Beautiful Isle of Somewhere
Goin' Home (Dvorak)
36106 Goin' Home
Beautiful Isle of Somewhere
36107 Elegie (Massenet)
The Swan (Saint-Saens)
25670 Nearer My God to Thee
Face to Face

FOR

THE REPRODUCTION OF RECORDINGS OF ALL TYPES, INCLUDING 16" TRANSCRIPTIONS.

RCA 16" PORTABLE PHONOGRAPH MI-4828

A complete turntable-amplifier-public address equipment for use wherever critical ears demand a high quality of performance and an instrument of pleasing appearance. A big sturdy 16" turntable for standard or transcription records. Two speeds (78 and 33⅓ r.p.m.) or variable speed. High gain, 6-watt amplifier especially matched for the finest recorded reproduction or for microphone and voice use. True tracking crystal pick-up and tone arm, revolutionary new RCA Accordion Cone loudspeaker with generous length of cable permits placement of speaker for best room coverage.

Entire equipment housed in two portable leatherette covered carrying cases. Size: Turntable, 23½" W., 8½" H., 18" D. Net weight, 32 lbs. Amplifier-Speaker: 14" W., 9" H., 17" D. Net Weight, 23 lbs.

MI-4828 (less microphone)—Code SHYAT **$136.00**

MI-4829 Turntable only—Code SIAPF **$68.50**

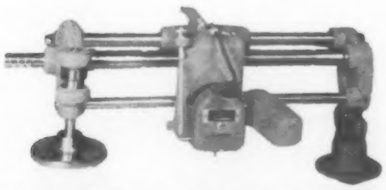
MI-4707 Amplifier and Speaker—Code SIASI **$67.50**

RCA DE LUXE 16" TURNTABLE

Here is a de luxe turntable for playing transcription or other records up to 16" in diameter. A high torque motor with rim drive assures constant speed (78 r.p.m. or 33⅓ r.p.m.) for the finest quality reproduction. Controls are included to permit use of the turntable as a de luxe portable recorder by merely adding an RCA MI-4815 or MI-4820 recording attachment. Complete turntable housed in an attractive gray carrying case, with cover. Size: 28½" W., 14" H., 23¾" D. Net weight, 82 lbs.

MI-4814—Code SEKVY.......................... **$236.50**

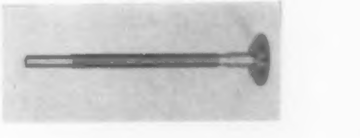
RCA RECORDING ATTACHMENT



With the addition of the RCA Recording attachments MI-4815 (outside-in) or MI-4820 (inside out), the RCA 16" turntable becomes a high quality portable instantaneous recording unit which can be attached to the RCA De Luxe Master Control (page 5) or may be used with other RCA high quality amplifiers.

MI-4815—Recording attachment (outside-in).
Code—SELGI............ **$120.00**

MI-4820—Recording attachment (inside out).
Code—SELMO........... **$120.00**



To change recorder attachments MI-4814, MI-4820, or De Luxe Recorder from outside-in or inside-out cutting, it is only necessary to change the lead screw.

MI-4819—(lead screw inside-out).
Code—SELQS............ **$22.50**

MI-4821—(lead screw outside-in).
Code—SELOQ........... **$22.50**

MI-4814 Turntable with recording attachment.

RCA VICTOR DE LUXE RECORDER

RCA Victor Model MI-12700 Instantaneous Recording and Playback Equipment, shown at the right, is entirely complete in itself, containing all the components necessary for making quality recordings and playing them back immediately after completion. The instrument is exceedingly versatile, accommodating discs of from six to sixteen inches in diameter, and recording either from center out, or from rim to center. Turntable speed may be set at either 78 or 33⅓ r.p.m.

A conveniently located visual volume-indicator facilitates control and regulation of the recording level, and a jack permits the use of any high impedance headphones for monitoring. Controls are also provided for regulation of the volume and tone in recording and in the playing of records.

The entire equipment is contained in a single smartly designed cabinet equipped with easy rolling casters. Its operation is free of complications so that it may be operated by persons without previous experience or training.

Other features of the RCA Victor De Luxe Recorder are a high-fidelity velocity microphone with floor stand, high torque constant speed motor and turntable assembly, and high-fidelity amplifier for the recording functions. A high-fidelity speaker, reproducing pickup and tone arm is also incorporated within the cabinet for immediate playback of the finished recordings.

Thus the instrument becomes, in addition to its outstanding performance as a recorder, a magnificent reproducing instrument upon which to play any Victor Record, in addition to the ones you make.

SPECIFICATIONS

VOLTAGE—105-125 volts A.C., 60 cycles.
POWER CONSUMPTION—155 watts.
INPUT IMPEDANCE—250 ohms; auxiliary jack 1,200 ohms.
POWER OUTPUT—3 watts.
OVERALL GAIN—105 db.
FREQUENCY RESPONSE—60-6,500 cycles.
LOUDSPEAKER—12" Permanent Field.
DIMENSIONS—43" H., 27" W., 22" D.
NET WEIGHT—136 lbs. Finish two-tone grey.

MI-12700—Complete with Tubes, Velocity Microphone and Floor Stand for rim to center recording. Code SEKQT. **$475.00**

MI-12700A—Complete as above, except center to rim recording. Code SEKRU. **$475.00**

USES CUTTER-HEAD FLOAT STABILIZER

An outstanding feature of this equipment is the new RCA Cutter-Head Float Stabilizer, which acts as a shock-absorber on the cutter-head and in this way assures utmost smoothness and freedom from flutter.

NEW RCA VICTOR PORTABLE RECORDER

WHERE it is desirable to move the equipment from place to place, RCA Victor offers another model—the Portable Recorder, Model MI-12701. This model, though considerably smaller than the de luxe model, is likewise entirely self-contained; and it holds within its case, in compact and convenient form, all of the components necessary for high-quality recording, as well as immediate playback of the completed record.

The turntable rotates at a speed of 78 r.p.m., and will accommodate discs of any diameter from six to twelve inches. Discs are cut from rim to center and thus are suitable for reproduction not only on the recorder, but also an any RCA Victrola. The recorder itself, through its superb reproduction facilities, may be used to play any Victor Record, in addition to the recordings you make with it.

Features include an RCA Aerodynamic Microphone complete with table stand; high quality amplifier; speaker; tone arm and reproducing pick-up. A jack permits the use of any high impedance head-phones for monitoring while recording, and a visual indicator facilitates accurate adjustment and regulation of volume for recording. Another control permits adjustment of tone when the instrument is used for recording and reproducing records.

Success and happiness in future years depend to a great degree on a child "knowing how to talk." The only means for accurate check on progress in voice training is the making of recordings of the pupil's voice. RCA Recordings make it easy for teachers to explain, and for pupils to understand errors. Photo below shows a pupil in the Holy Rosary School at Indianapolis making voice test record on RCA Victor Portable Recorder.

SPECIFICATIONS

VOLTAGE—105/125 volts A.C., 60 cycles.
POWER CONSUMPTION—127 watts.
INPUT IMPEDANCE—100,000 ohms.
POWER OUTPUT—3 watts.
OVERALL GAIN—105 db.
FREQUENCY RESPONSE—60–6,500 cycles.
LOUDSPEAKER—6″ Permanent Field.
DIMENSIONS—12½″ H., 15½″ W., 17½″ D.
NET WEIGHT—37½ lbs. Finish grey.
MI 12701 Complete with tubes, aerodynamic microphone and table stand **$179.00**
Code SEKUX.

RCA VICTROLA (WITH RADIO)

FOR SCHOOLS OF ALL SIZES

IMPORTANCE OF RADIO TO SCHOOLS STEADILY INCREASING

RCA Victrolas with radio and RCA Victor Radios open up a vast and fascinating world of material for enriching the school curriculum.

Whether it is today's amazing drama of history in the making, broadcast from the world's capitals—or the many valuable educational and cultural programs now on the air—radio is becoming more and more important in the plans of a modern school.

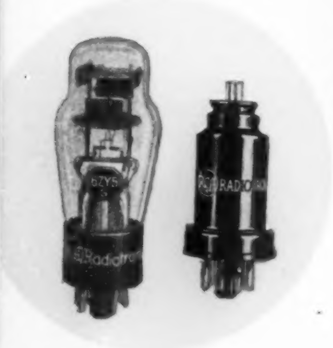
The requirements of a large city school, of course, differ greatly from those of a small rural school without electricity. But, whatever your requirements, you will find exactly what you need among the many new RCA Victor radios. From high-quality, low-priced table models for the classroom to magnificent consoles for auditorium use. RCA Victor provides an almost unlimited choice to meet every school situation.

SEE YOUR RCA VICTOR DEALER FOR A DEMONSTRATION

It is not possible to list and describe on these pages all the RCA Victor receiving sets (AC, AC-DC or battery operated) which are suitable for use in schools; but the sketches below show the representative types in each of which there are many different models. Your RCA Victor Dealer or Distributor is ready to recommend and demonstrate the instruments most desirable for any situation.

HAVE YOUR RADIO AND SOUND EQUIPMENT INSPECTED PERIODICALLY

No radio or sound equipment is better than the condition of its parts—particularly its tubes. And, inasmuch as the loss in the efficiency of tubes is gradual, the difference in performance of the equipment from day to day is not always evident to the user because there is nothing with which to *compare* the sound. However, this gradual loss in efficiency should be checked before an interruption in service occurs.



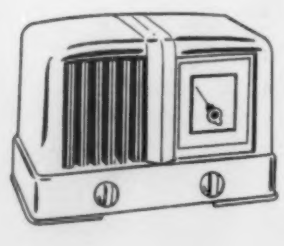
RCA Victor Dealers in all parts of the country maintain servicing facilities in order that you may continue to receive from RCA Victor radio and sound equipment the high level of performance it gave when installed.

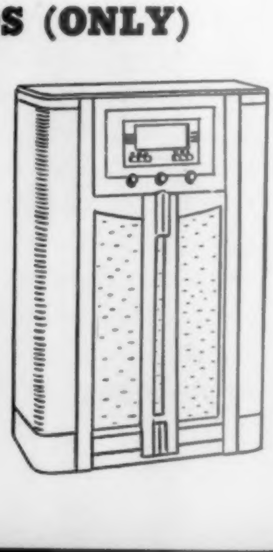
THIS CHECK-UP SHOULD INCLUDE:

1. Check overall set performance for sensitivity, selectivity and fidelity.
2. Test and label all tubes.
3. Check speaker and cabinet for rattles.
4. Inspect and test all power connections.
5. Check aerial, ground and lightning arrester connections.
6. Align antenna, detector and oscillator circuits.
7. Adjust dial to normal kilocycle reading.
8. Check causes of extraneous noises.
9. Clean interior of cabinet.

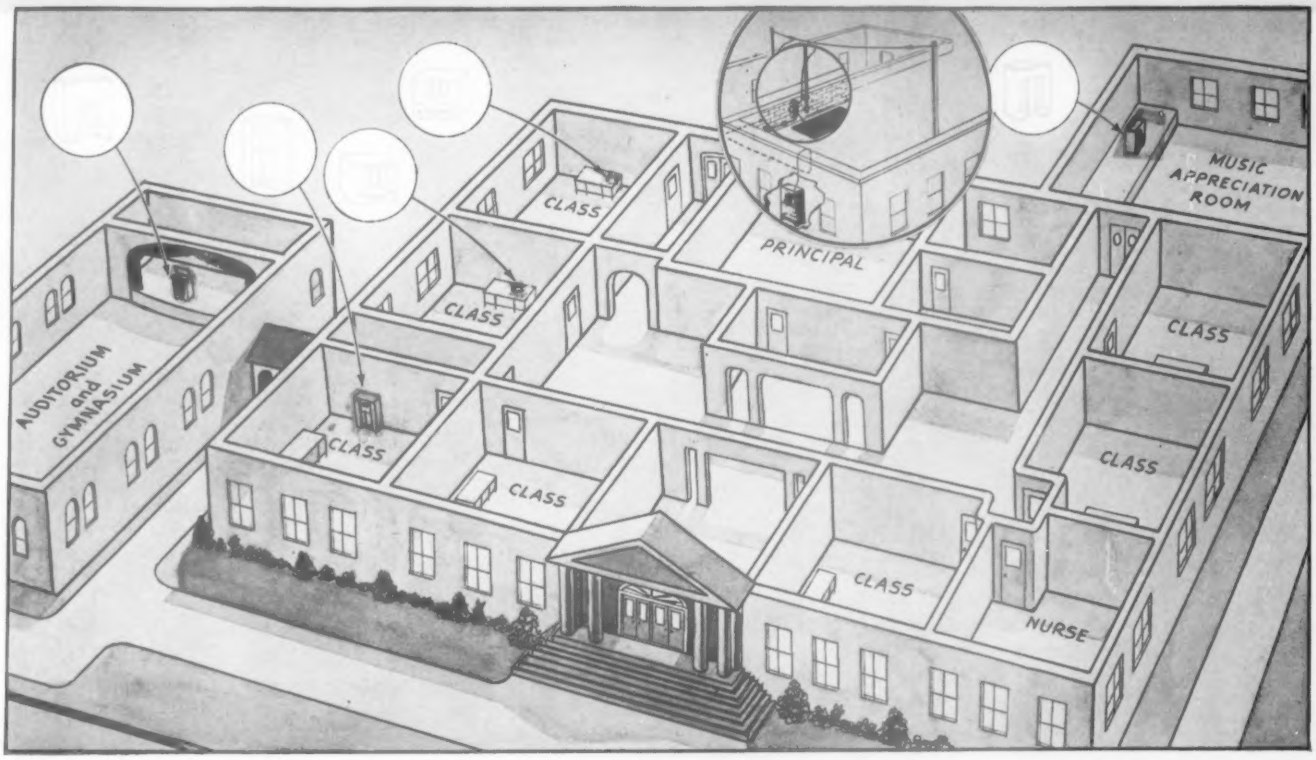
RCA VICTROLA (WITH RADIO)

RADIOS (ONLY)





AND RCA VICTOR RADIOS



A RADIO-EQUIPPED SCHOOL IS A BETTER SCHOOL

RCA Victor Radio receiving sets and accessory equipment are designed to meet the radio requirements of any school. The above sketch illustrates one up-to-date method of equipping a school with radio receiving instruments and related equipment; namely, RCA Victrolas in the auditorium and music room, with portable radio receivers in the classrooms. A Victrola attachment can be used to play records through these receivers. All may be connected to a single RCA Antennaplex System. Such a system will provide for the simultaneous operation of any number of radio receiving sets in one building.

RADIOS AND VICTROLAS AID IN TEACHING

Music Appreciation	Domestic Science
Musical Instruments	Dancing
Social Science	Typewriting
Current Events	History
Gymnastics	Voice Training
Language Studies	Literature
Art	

Check and Mail ➔

(NO POSTAGE REQUIRED

RCA Victor Audio Visual Service For Schools

Complete Information Concerning Equipment Checked will be Appreciated

- ☐ Amateur Radio { ☐ Receiving ☐ Transmitting
- ☐ Laboratory Measuring Equipment
- ☐ Motion Picture Projectors { ☐ 16mm. ☐ 35mm.
- ☐ Music Appreciation Books
- ☐ Radio Receivers { ☐ Portable ☐ Console
- ☐ Recording Equipment { ☐ Portable ☐ Console
- ☐ School Broadcast Equip.
- ☐ School Sound System for.....................rooms
- ☐ Sound Amplification Systems { ☐ Portable ☐ Fixed
- ☐ Test Equipment and Parts for Laboratory
- ☐ Transcription Reproducers
- ☐ Victor Records for Schools { ☐ Elementary ☐ Secondary
- ☐ Victrola Attachments for Radio
- ☐ Victrolas { ☐ Phonograph only ☐ Radio and Phonograph
- ☐ RCA Tubes { ☐ Receiving ☐ Power
- ☐ ....

It is understood this places me under no obligation to purchase.

NAME..

SCHOOL..

ADDRESS..

CITY.................................... STATE....................

LABORATORY AND TEST EQUIPMENT FOR SCHOOLS

RCA EQUIPMENT FOR SCHOOL LABORATORIES

To meet the needs of a growing number of schools offering courses in science, radio and electrical engineering, RCA Victor offers a complete line of scientific radio and electrical test equipment for laboratory use. These instruments are the products of years of experience and research by RCA Victor engineers, and are used in the radio and television research laboratories of RCA Victor, the largest of their kind in the world. They are also used in Radio Schools and by Radio Servicemen in all parts of the world.

5" STANDARD CATHODE-RAY OSCILLOGRAPH No. 160

New 5" cathode-ray tube affording large, clear trace; graduated viewing screen permitting direct measurement of deflection amplitudes.

Freq. Characteristic Vert. Amp. (gain max.) 3 cycles-50 kc. essentially flat.

Freq. Characteristic Horiz. Amp. 5 cycles-100 kc. essentially flat.

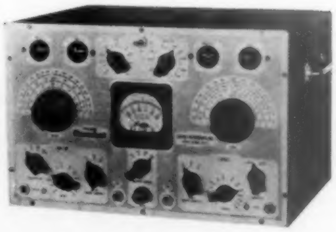
Horizontal Sweep Voltage 4 cycles to 22,000 cycles.

ULTRA-SENSITIVE D-C METER NO. 9819

An extremely sensitive portable instrument for accurate measurements of current, voltage, and resistance in d-c circuits of low current values.

Sensitivity greater than that of any portable meter of the pivot or suspension type, the most sensitive range giving a deflection of one scale division (over $1/16''$) with a current of 0.0004 micro-ampere.

THE RIDER CHANALYST



Of particular interest to schools is this new RCA instrument. It is designed to locate *quickly* the source of troubles in faulty radio receivers. It does this by *tracing the signal* from where it enters the radio receiver (the antenna) right through the set to the loudspeaker.

The Rider Chanalyst is particularly useful in explaining the *operation* of a radio receiver—for, in tracing the signal, which is visually indicated by the Chanalyst, the student is able to follow the course of the signal *right through* the receiver and thus better understand *how* a receiver works. Used in connection with an RCA Oscillograph, it enables the student to actually *see* the wave form of the various currents and, therefore, more clearly understand the circuits and their functions.

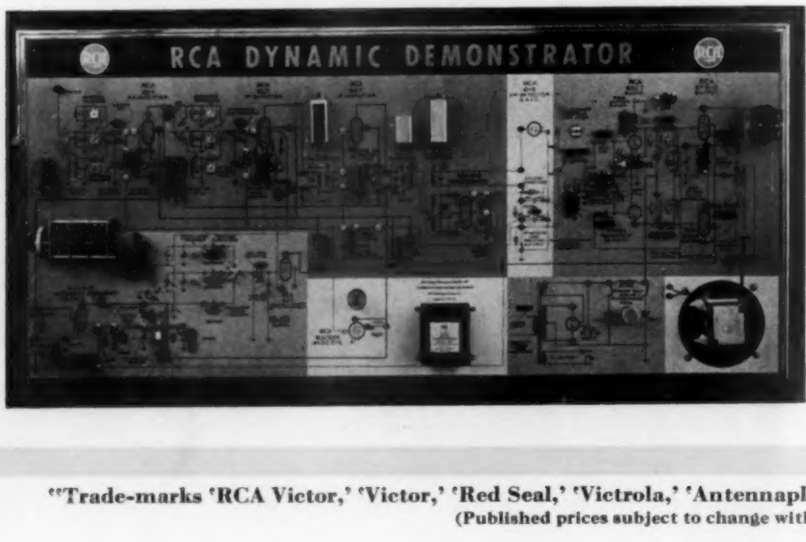
COMPLETE CATALOGS OF RCA LABORATORY EQUIPMENT AND PARTS

Due to space limitations only three of the many useful RCA instruments are mentioned here. Dozens of others are described in these two new catalogs which are available upon request. Write the Educational Department, RCA Manufacturing Co., Inc., Camden, N. J.

RADIO AND TELEVISION TEST EQUIPMENT
(*Parts and Accessories*)
RCA MEASURING EQUIPMENT

RCA DYNAMIC DEMONSTRATOR

The Working Schematic Circuit Diagram



The RCA DYNAMIC DEMONSTRATOR, when used in conjunction with RCA Test Equipment, shows exactly how the most complicated circuits function. It facilitates instruction methods and provides the student with an effective method for observing by visual, aural, and/or quantitative means all functions and phenomena that occur in a radio circuit—from antenna to loudspeaker, using the popular system of signal tracing.

For the student preparing for the radio-service profession, the RCA DYNAMIC DEMONSTRATOR furnishes a practical short-cut method for learning time-saving service principles.

WESTERN ELECTRIC COMPANY

New York, N. Y.

Distributor in the United States
GRAYBAR ELECTRIC COMPANY
Graybar Building, New York, N. Y.

Distributor for Canada and Newfoundland
NORTHERN ELECTRIC COMPANY, LIMITED
1261 Shearer Street, Montreal, P. Q.

Western Electric

SOUND DISTRIBUTION SYSTEMS

General

Western Electric equipment picks up, amplifies and distributes speech or music to all parts of an auditorium—to any or all rooms in a building—or to a number of points out-of-doors. The source of the program may be (1) Microphones, (2) Record Reproducer, (3) Radio Receiver.

New equipment developed by Bell Telephone Laboratories for the Western Electric Company now provides for greater quality and flexibility of use than heretofore.

Many up-to-the-minute schools, colleges and universities in all parts of the country have found Western Electric sound distribution systems valuable—for both educational and administrative uses.

The 639 Type microphone is especially adaptable to school needs.

What goes into a Sound System?

There's much more to a good sound distribution system than just electrical equipment. The following six factors must all be balanced with expert care. (1) Sound Origin—whether speech, or music, or both, (2) Sound Pick-up, (3) Amplifiers, (4) Loud Speakers, (5) The Room or Rooms—size, shape, acoustics, etc., (6) The Audience—whether large or small.

Because these factors vary so widely in different installations, each Western Electric sound system is skillfully engineered to meet the specific needs in each case.

Workmanship, Service and Cost

Quality workmanship and performance are assured by the name Western Electric—manufacturer of telephones and other sound-transmission apparatus for the Bell System since 1877.

Stocks of spare parts, engineering advice and expert service are always available through distributors located at strategic points throughout the country.

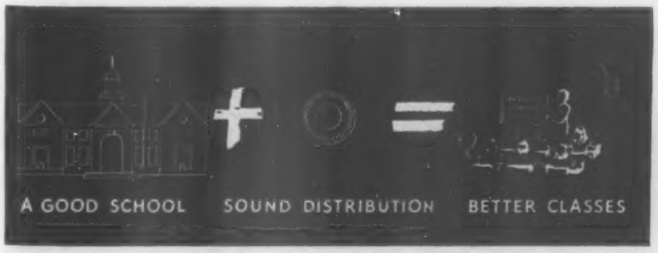
In estimating the cost of installation, specific requirements must be considered. Graybar Electric Company specialists—with years of experience in this work—will gladly survey your buildings, recommend a system for adequate coverage, furnish complete specifications and an estimate of cost.

Operating costs are surprisingly low—only a few cents an hour.

Uses in Schools

Sound distributing equipment is a valuable aid to teachers of languages, current events, music appreciation, home economics and other courses. It enables the principal to address all classrooms from his desk; delivers fire drill instructions and emergency announcements instantly; supplies music or voice amplification in gymnasium or auditorium. Its usefulness extends throughout the school day.

For full information, write to the distributors listed at top of page.



WESTERN ELECTRIC AUDIOMETERS

Poor hearing is often the cause of poor classwork. With the Western Electric 4C Audiometer, pupils' hearing acuity may be measured quickly and scientifically—as many as 40 at one time.

This scientific instrument consists of a turntable with magnetic reproducer—and from 10 to 40 headsets through which pupils listen. It plays records, scientifically designed to show degree of hearing loss. Pupils write what they hear on data sheets. By checking these against a master sheet, even slight hearing defects are seen at a glance. Ask the distributors for booklet giving full details.

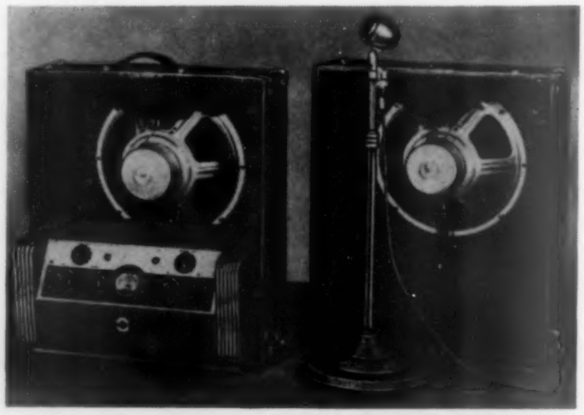
LAFAYETTE RADIO CORPORATION

100 Sixth Avenue, New York, N. Y.

ATLANTA—265 Peachtree St. NEWARK—24 Central Ave. JAMAICA, L. I.—90-08 166th St. CHICAGO—901 W. Jackson Blvd. BOSTON—110 Federal St. BRONX—542 E. Fordham Rd.

Lafayette
SOUND SYSTEMS

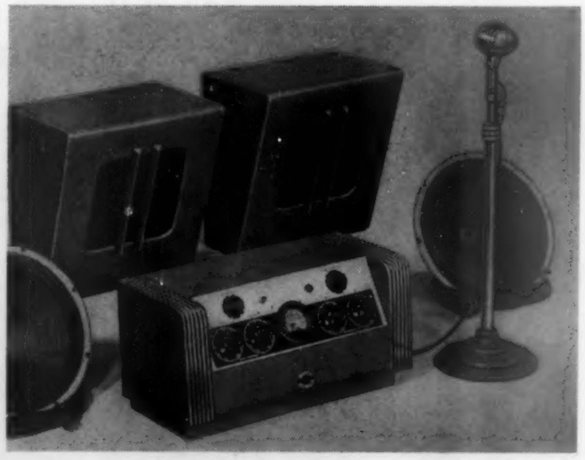
Meet Every School Requirement for Modern Centralized Public Address Service



Whatever your school requires—Sound reinforcement indoors or out, single or multiple installations for permanent or portable use—there's a Lafayette Sound System designed for every purpose. 20 years of Sound engineering experience has enabled Lafayette to anticipate school needs.

A LAFAYETTE FOR EVERY SOUND PURPOSE

Lafayette Sound equipment can increase your school's efficiency in various modern ways. As many as 12 persons or departments can be reached from the main office, for example, with a Lafayette intercommunicating System. Or the entire student body may be addressed simultaneously in their individual classrooms. (This, of course, is invaluable in emergencies.) Instruction in music appreciation may be given directly from broadcasts or recordings, with commentary by the instructor. For school dramatics and other activities in halls where the acoustics are poor, a Lafayette Sound System is a necessity today. Again, at school dances and entertainments, guests can enjoy the best in appropriate music with a permanent or portable Lafayette Sound System on the premises.



Innumerable schools have found that their Lafayette Sound System has brought increased attendance to track events, football, baseball and other games, both in the stadium and gymnasium. Sports results and announcements can be made over this P.A. system so that all may hear. Also, intermission entertainment is easily provided.

CONSULT LAFAYETTE SOUND ENGINEERS

To give your school all the modern advantages of centralized or separate public address systems, you are invited to write Lafayette's Consulting Engineers. Give all pertinent data in order that we may suggest the Lafayette equipment best fitted to your individual needs. A special form, which we will gladly send you on request, has been prepared to assist you in outlining your requirements.

LAFAYETTE *FREE* CATALOG

Free 196-page catalog describes and illustrates the complete line of Lafayette Public Address equipment, designed to modernize your school, enhance your curriculum and save you important money. Write today for your FREE copy. Dept. 34.

Lafayette
THE WORLD'S LARGEST RADIO SUPPLY HOUSE

GENERAL ELECTRIC COMPANY

1 River Road, Schenectady, New York

MOTION PICTURES

The General Electric Company is glad to loan the motion pictures listed below to schools, colleges, and other organized groups. Films for exhibition in the United States are loaned free, except for the small shipping charge. They may be obtained by applying to one of the twelve distributing points located throughout the country and listed in the catalog. Write for the General Electric film Catalog GES-402F, which contains a description of the subjects listed and general ordering instructions.

CLASSIFIED INDEX OF SUBJECTS

SCIENCE

Hottest Flame in the World
Constitutions and Transformations of the Elements
Arrangement of Atoms and Molecules in Crystals
Liquid Air
Cathode-ray Tube
Early Experiments of Michael Faraday
Magic vs. Science
Beyond the Microscope
Excursions in Science No. 1
Excursions in Science No. 2—No. 3—No. 4

GENERAL

Walter Damrosch
Life of Thomas A. Edison
Service to Agriculture
*Just Around the Corner
The Benefactor
Thomas A. Edison
The Yoke of the Past
*From Now On
The Molder
Something New Under the Sun
*Three Women
Bill Howard, R.F.D.
The World's Largest Electrical Workshop

WELDING

The Electric Needle
Ties of Steel
Automatic Arc Welding
Welding Battered Rail Ends
Arc Welding in Building Erection

* Available from Schenectady only.

ELECTRIC EQUIPMENT

Unseen Values in G-E A-c Motors
Service to Industry
Unseen Values in G-E D-c Motors
Quality Motors in the Making
The Busybody
Mountains of Copper
A Modern Zeus
Electric Heat in Industry
Enameling by Electric Heat
How the G-E Icing Unit Works
When You Can Measure
More Goods for More People with Automatic Control

LIGHT AND LIGHTING

Brighter Times Ahead
The Light of a Race
Mazda Lamp Manufacturing

GENERATION AND DISTRIBUTION OF ELECTRICITY

Steam Turbines
Power Transformers
Induction Voltage Regulator
Hydroelectric Power
Installing a Primary Network Equipment
Oil-filled Cable
There's a Difference

INDUSTRY

The Potter's Wheel
Cuba, The Island of Sugar
The Land of Cotton
The Sugar Trail
A Woolen Yarn
Conquest of the Forest
The Conductor
Our Daily Bread
Wizardry of Wireless
The World of Paper
Anthracite
Bituminous
Pillars of Salt

TRANSPORTATION

Conquest of the Cascades
The Broken Barrier
The Zephyr
King of the Rails
Queen of the Waves
Trolley Coaches
The Panama Canal
Illinois Central Locomotive
Modern Electric Transit

AUTOMATIC DEVICES COMPANY

1037 Linden Street, Allentown, Pa.

EXPORT DEPARTMENT—220 W. 42nd Street, NEW YORK, N. Y., U. S. A.

DIRECT FACTORY REPRESENTATIVES

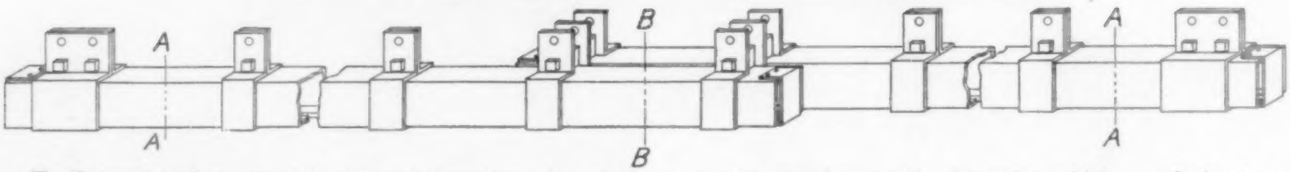
CHICAGO, ILL., N. C. Nussbaumer, 1050 N. Humphrey Avenue, Oak Park, Ill. ST. LOUIS, MO., A. M. Pollack, 1310 Midland Drive

PRODUCTS

"Silent-Steel" Heavy Duty Curtain Track.
"Besteel" Medium Duty Curtain Track.
"Steelite" Light Duty Curtain Track.
"Aerial" Type Unit-Combination Track and Machine: 1/3 hp.
"Silver Service" High Speed Curtain Machine: 1/2 hp.
"Autodrape" Standard Curtain Machine: 1/3 hp.
"Autodrape" Special Curtain Machine: 1/4 hp.
"Stabilarc" Motor-Generator for Projection Arc Supply.

CURTAIN TRACKS

Turnbuckles, Pipe-Batten Hangers, Wall or Ceiling Brackets Supplied as Desired

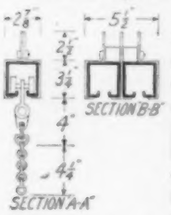


To Determine Gross Length of Track Required—As a basis, start with the clear width of opening which curtain is to uncover; i.e., distance between inside edges of curtain halves when in open position. Add 10% for lap at center for curtain when closed. Add 10% for extension on each end to accommodate each half of curtain when in open position. Total addition is 30%.

Example: Open curtain is to expose 30 ft. clear width. Add total of 30% or 9 ft. for center lap and both end extensions. Specify 39 ft. gross length, in two sections each 19 ft. 6 in.

"SILENT-STEEL" HEAVY DUTY CURTAIN TRACKS

For Any Length—with Curtain of Any Weight



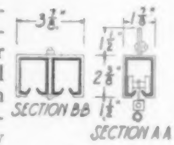
Section Dimensions

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be supported on ball bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel ball bearing wheels adequately guarded; Model No. 280 as manufactured by **Automatic Devices Company** of Allentown, Pa.

"BESTEEL" MEDIUM DUTY CURTAIN TRACKS

For Lengths up to 36 Ft.—with Light or Medium Weight Curtains

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be of cadmium-plated steel construction supported on self-lubricating bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel, ball-bearing wheels adequately guarded; Model No. 170 as manufactured by **Automatic Devices Company** of Allentown, Pa.



Section Dimensions

AUTOMATIC CURTAIN MACHINES

"Autodrape" Curtain Machines

All "Autodrape" machines are equipped with exactly the same gear reduction unit, base and automatic reversing switch mechanism, including the following features:

(1) Limit Switch Arrangement—Adjustment for "open" and "close" positions reduced to simplest form.

(2) Elevator Type Traction Drive—Maximum delivered power without slippage.

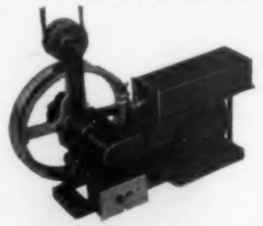
(3) Mounting—Endless cable design allows installation of machine at any position in vertical plane of track.

(4) Disconnecting Clutch—For conversion to hand operation.

(5) Automatic Overload Protective Breaker—Protects machine against excessive loads.

(6) Motor—1/4 or 1/3 hp., single phase.

(7) Speed—92 or 115 ft. per minute, equivalent to curtain separation of 2¾ or 3½ ft. per second, respectively (based on 60-cycle current).



"Autodrape" Standard Model

Over-all dimensions: 19½ in. long, 10 in. wide, 15⅛ in. high

"Autodrape" Special Models—These models have features listed at left and are the lowest priced fully automatic machines on the market; 1/4 hp.

Recommended for use with "Silent-Steel" or "Besteel" Tracks up to about 36 ft. gross length.

"Autodrape" Standard Models—In addition to the features listed at left these models include idler system and finger-tip control switch attached to machine; 1/3 hp.

Recommended for use with "Silent-Steel" Curtain Tracks up to about 50 ft. gross length.

"Silver Service" Curtain Machine

This model has all the features of the "Autodrape" Standard Machine. It is equipped with 1/2-hp. motor delivering a cable speed of 125 or 155 ft. per minute equivalent to curtain separation of 4 or 5 ft. per second.

Recommended for use with "Silent-Steel" tracks up to about 80 ft. gross length.

REPRESENTATIVE INSTALLATIONS

Public Schools
New York, N. Y.
Philadelphia, Pa.
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CAPITOL STAGE LIGHTING COMPANY

E. ALTMAN, Proprietor

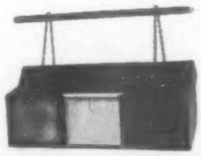
527–529 West 45th Street, New York, N. Y.

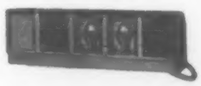
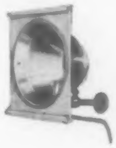
Cable Address: CAPCOLITE, New York

Distributed Abroad by
ELECTRICAL RESEARCH PRODUCTS, INC.
Subsidiary of
WESTERN ELECTRIC COMPANY

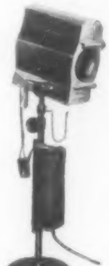
Manufacturers of complete

Stage Lighting Apparatus for the Theatre, Production, Amateur Theatricals, Schools, Churches, Community Center, Little Theatres, Halls, Etc.









- Aisle Lights
- Asbestos Wire
- Automatic Colorwheels
- Automatic Lighting
- Act Announcers
- Arc Lamps
- Advertising Novelties
- Borderlight Cables
- Baby Spotlights
- Boomerangs
- Borderlights
- Bunchlights
- Cable Clamps
- Cable Supports
- Carbons
- Colorine
- Connectors
- Crystal Reflectors
- Carbon Holders
- Cleaner Stands
- Colorframes
- Colorwheels
- Cove Lighting
- Crystal Showers
- Dissolvers
- Dimmers
- Dimmer Boxes
- Electric Fountains
- Electric Coal Grates
- Electric Fire Logs
- Effects
- Exit Signs
- Floor Pockets
- Fireplaces
- Floodlights
- Footlights
- Film Cabinets
- Gelatine
- Iris Shutters
- Lenses
- Light Fixtures
- Lobsterscopes
- Lugs
- Lens Holders
- Music Stands
- Mirror Balls
- Organ Lights
- Olivettes
- Objectives
- Piano Lights
- Pipe Clamps
- Plugging Boxes
- Proscenium Lights
- Panel Pockets
- Plugs
- Reflectors
- Rheostats
- Sciopticons
- Spotlights
- Stage Pockets
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- Switch Boxes
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- Step Lights
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- Switchboards
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- Etc.

COMPLETE CATALOG ON REQUEST







Originators and Manufacturers of "KLIEGLIGHTS"

KLIEGL BROS.

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

EST. 1896

321 West 50th Street, New York, N. Y. Tel.: COlumbus 5-0130

STAGE LIGHTING

EFFECTIVE illumination of theatrical presentations, requires a variety and multiplicity of lighting devices. For convenient reference, condensed information on standard items in general use, particularly the portable type of equipment, accessories, and effects, is here included. Information on equipment or devices not shown, will be furnished on request.

Anything required for theatrical lighting can be supplied by Kliegl Bros.—foremost manufacturer in this field of specialty lighting. Long experienced and reputable—you have our assurance that dependable service and satisfactory performance may be expected from our products.

ARC SPOTLIGHTS

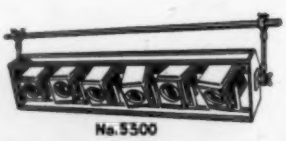
No.10

Standard hand feed arc spotlights for stage use and effect projection. (High amperage long range spots for front lighting from projection booth, etc., are listed in Bulletin No. 44.)

Comprise carbon arc lamp in suitable housing. Fitted with condensing lens. Slide grooves on front for spotlight attachments. Adjustably mounted on telescopic pedestal floor stand. Provided with external focusing and arc feed control. Hand grip for directional movement. Arc ballast resistance on stand. Enclosed line switch. 25 ft. of cable.

No.	Amp.	Lens Dia.	Price
6	25	6"	$71.00
9	35	6"	79.00
10	50	6"	107.00

SPOT BORDER



No.5300

Semi-portable, usually hung from first pipe batten, for trick lighting, blocking out shadows, etc. Consists of group assembly of incandescent spotlights, in a suitable frame, individually mounted so that each spotlight can be independently directed and focused; and separately wired for individual light control: standard and special arrangements.

No. 5300—spot borderlight, furnished complete with six No. 53—250/400 watt spotlights; 6 ft. cradle, with adjustable end hangers and pipe clamps. Each spot wired with asbestos leads and pin-plug connector attached. Supplied with color frames for gelatines. Price **$85.00**

FLOODLIGHTS

No.533

No.546

No.540

No.1N

Stage types for use from side wings or from overhead. Provided with slide grooves on front for accommodation of color frames with gelatine mediums. For standard incandescent filament lamps.

BRACKET UNITS:

No. 533—wall and backing flood for 250 watt G30 medium screw base spot lamp. Alzak aluminum reflector; swivel mounting; wall bracket or table base; asbestos lead wires; slide grooves and color frame. Price **$13.00**

HANGING UNITS:

No. 540—Open box reflector sprayed heat-proof white; for 500 watt P.S. lamp; asbestos lead wires; chain hangers; grooves for color frame. Price **$11.50**

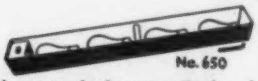
No. 546—Parabolic boxed Alzak aluminum reflector; for 500 watt P.S. lamp; asbestos lead wires; grooves for color frames; pipe clamp hanger. Price **$20.00**

STANDING UNITS:

No. 1N—Open box reflector sprayed heat-proof white, grooves for color frame; for 500/2000 watt P.S. lamps; pedestal floor stand, 25 ft. cable. Price **$24.00**

No. 2N—Parabolic boxed Alzak aluminum reflector; grooves for color frame; 500/2000 watt P.S. lamps; pedestal floor stand; 25 ft. cable. Price **$40.00**

STRIP LIGHTS



No.650

Stage type, used at entrances, back of transparencies, behind ground rows, and general service. Portable open trough reflector with series of screw base receptacles, for 40/150 watt general service lamps; wired on one 2-wire circuit, terminating in a suitable splice box.

No.	Description	Length, Feet	Price
649	2-light strip	1½	$7.80
650	4-light strip	3	10.80
651	6-light strip	5	13.80
652	10-light strip	8	18.80

PORTABLE FOOTLIGHTS

No.629

Where no permanent equipment is available, these portable footlights may be temporarily used. No recess in floor is required. Simply placed in position; form of design directs the light at proper angle.

No. 629—portable footlight; 8 ft. section with single row screw base receptacles, 4" on centers, for 60/100 watt lamps, wired alternately on three 2-wire circuits for control of colors. Cables extending with pin-plug connectors attached. Continuous reflector sprayed permanent white. Price **$44.00**

Other lengths or arrangements available.

KLIEGLIGHTS

No.1366-CR

No 1163-E

High intensity beam projectors with ellipsoidal reflectors, lens system, and coordinated shutter arrangement which permits regulation of size and shape of light beam. Accommodate standard T-type bipost base-up burning concentrated filament lamps.

Drop-in shutter arrangements use removable aperture slides for framing, which are inserted in a slot opening in housing between lamp and lens.

Built-in shutter arrangements have a four way adjustable shutter system within the projector, and external means for easy manipulation; and may be additionally equipped with an inbuilt iris shutter.

Hanging units are wired with short asbestos leads, and supplied with yoke and pipe clamp. Portable units are mounted on telescopic floor stand (with or without roller casters as indicated) and furnished with 25 ft. cable and pin plug.

Cat. No. *	Lamp Watts	Lens Dia.	Type Shutters	With (E) Pipe Clamp	With (C) Floor Stand
1163	250/500	5"	Drop-in	$28.00	$34.50
1165	250/500	6"	Built-in	48.00	54.50
1366	1000/2000	6"	Built-in	90.00	100.00 †

* Note: for pipe clamp add suffix "E" to catalog number; for floor stand add suffix "C."

† With roller caster spider base and rubber cable, $15.00 additional, No. 1366-CR.

For inbuilt iris shutter, add $15.00 to above prices.

INCANDESCENT SPOTLIGHTS

Fresnel Lens Types

No 43N3-A

No. 43N6-E

No. 43N12-CR

Equipped with Fresnel lens—producing a soft-edge high intensity light beam. Accommodate standard concentrated filament incandescent lamps. Fully equipped with adjustable lamp carriage for focusing. Alzak aluminum reflectors. Slide grooves for color frames. Furnished with suspension mounting, wall bracket, table base, or floor stand.

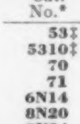
Hanging units with pipe clamp for mounting are wired with short asbestos leads (except Nos. 43N3 and 43N6—which are usually supplied with extension cord and attachment plug). Portable units are mounted on telescopic floor stand (with or without roller casters, as indicated) and furnished with 25 ft. of cable and pin-plug.

Cat. No. *	Lamp Watts	Lens Dia.	With (A) Wall Bracket	With (E) Pipe Clamp	With (C) Floor Stand
43N3	100	3"	$10.00	$10.00	$13.00
43N6	500	6"	17.00	17.00	20.00
43N8	1000	8"	45.00	45.00	55.00†
43N12	2000	12"	75.00	75.00	87.00†
43N16	5000	16"	100.00	100.00	118.00†

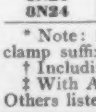
* Note: for wall bracket add suffix "A" to catalog number; for pipe clamp suffix "E"; for floor stand suffix "C."

† With roller caster spider base, rubber cable, and switch, add as follows: No. 43N8-CR $20.00; No. 43N12-CR $28.00; No. 43N16-CR $32.00

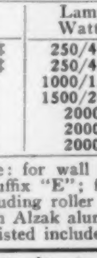
Plano-Convex Lens Types



No 53-E



No. 70-E



No.6N 14-C

Standard general utility spotlights with the usual clear-glass plano-convex condensing lens. For use with concentrated filament lamps. Sliding lamp carriage adjustable for focusing.

Hanging units are wired with short length asbestos leads, and furnished with yoke and pipe clamp. Portable units are mounted on telescopic round base floor stand, and furnished with 25 ft. cable and pin-plug.

Cat. No.*	Lamp Watts	Lens Dia.	With (A) Wall Bracket	With (E) Pipe Clamp	With (C) Floor Stand
53‡	250/400	4½"	$12.00	$12.00	$15.00
5310‡	250/400	4½"	14.00	14.00	17.00
70	1000/1500	6"	33.00	33.00	39.50
71	1500/2000	6"	37.00	37.00	45.00
6N14	2000	6"	37.00	37.00	43.00
8N20	2000	8"	60.00	60.00	66.00
8N24	2000	8"	——	——	103.00†

* Note: for wall bracket add suffix "A" to catalog number; for pipe clamp suffix "E"; for floor stand suffix "C."

† Including roller caster base, rubber cable and switch; suffix "CR."

‡ With Alzak aluminum reflector back of lamp position $1.60 additional. Others listed include reflector.

for **PERMANENT EQUIPMENT** for *Lighting the Stage or Auditorium — write for* **BULLETIN NO. 44**

COLOR WHEELS

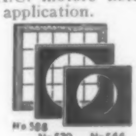
Used on spotlights for changing the color of the light projected. Rotary frames designed to hold four or more different colors. Support fits into slide grooves on front of spotlight.

No 22

No 31-AC

No.	Wheel, Dia.	No. of Colors	Lens * Size	Price
Hand Operated				
14	13½"	5	4½"	$3.00
22	18"	5	5" or 6"	5.50
24	20"	7	5" or 6"	7.50
23	24"	5	8"	11.00
Motor Operated				
14AC	15⅜"	6	4½"	$15.00
31AC	20"	6	5" or 6"	25.00
35AC	24"	5	8"	35.00

* For use with spotlight; lens size as indicated.
A.C. motors listed. Can also be furnished with D.C. motors—prices on application.



No 588 No.570 No.566

COLOR FRAMES

Used with spotlights, floodlights, and other apparatus herein described. Other sizes and designs available, for both gelatine and glass media.

Cat. No.	Frame, Size, Inches	No. of Colors	Applications *	Price
1032	3½ x 3½	1	A	$0.25
1033‡	5 x 5⅜	1	B	0.75
574	5¼ x 6	1	C	0.25
1035‡	6⅛ x 6⅛	1	D	0.75
566	8 x 9	1	E	0.30
570	10 x 11	1	F	0.60
580	12 x 12	1	G	1.20
577	12 x 12½	1	H	1.40
578	12¾ x 14	1	I	1.50
582	14¼ x 15	1	J	1.60
585	18 x 20	1	K	2.00
588†	18 x 20	1	K	0.60

‡ For gelatine or glass; others listed for gelatine only.
† Wooden frame, all others listed are metal.
* Key to applications: Catalog numbers of Kliegl products on which frames are used: (A) 43N3; (B) 1163; (C) 53; 5310; (D) 43N6; (E) 1165; 70; 71; 6; 6N14; 9; 10; (F) 1366; 43N8; 8N20; (G) 533; (H) 540; (I) 43N12; (J) 546; (K) 1N; 2N.

COLOR GELATINES

Conventional gelatine sheets, 20" x 24", in following colors. Price $0.14 per sheet. Packing charge $0.15 additional on orders for less than $5.00.

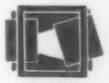
G-1	Frosted	G-18	Chocolate	G-35	Dk. Blue
G-2	Straw	G-19	Rose Pink	G-36	Green Blue
G-3	Lt. Lemon	G-20	Dubarry Pink	G-37	Lt. Green
G-6	Md. Lemon	G-21	Magenta	G-38	Md. Green
G-9	Dk. Lemon	G-22	Rose Purple	G-39	Dk. Green
G-10	Lt. Amber	G-23	Dk. Purple	G-41	Very Dk. Green
G-12	Md. Amber	G-27	Dk. Violet	G-42	Moonlight Blue
G-13	Dk. Amber	G-28	Lt. Violet	G-43	Lt. Sky Blue
G-14	Orange	G-29	Very Lt. Blue	G-44	Surprise Pink
G-15	Lt. Red	G-30	Lt. Blue	G-69	Surprise Purple
G-16	Md. Red	G-31	Md. Blue	G-77	Surprise Violet
G-17	Dk. Red	G-32	Md. Dk. Blue		

Heat and moisture proof gelatine sheets 20" x 22" also available. Price $0.28 per sheet.

LAMP COLORING

"**Signaloid**" solution for coloring incandescent lamps of all sizes up to 60 watts. Suitable for stage and indoor use. Hot dip process. Produces brilliant and durable transparent color coating. Stock solutions: Frostine, Yellow, Amber, Red, Pink, Purple, Blue, Green, and Moonlight Blue. Prices: $1.35 per pint; $2.50 per quart.

"**Weatherproof**" coloring, stock solutions: $3.50 per pint; $6.00 per quart.



No.33B

No.34

FRAMING SHUTTERS

Used with spotlights and other projection apparatus for controlling and framing light areas—stage openings, drop curtains, etc. Fit slide grooves provided on apparatus. Most commonly used types are listed; other designs are available.

No.	Description	Price
33-B	4-way cut-off; 9" x 8"; for 5" spot	$1.50
34	4-way shutter for 6" spotlights	4.00
34-A	4-way " " 8" "	4.50
34-B	4-way " " 4½" "	3.00

IRIS SHUTTERS

For spot control from black out to full opening; for fading on and off, or for spotting with ray of light before projecting full beam. Adjustable diaphragm in suitable frame, with control lever extending.

No.	Description	Price
257	For 6" lens spotlights	$12.00
258	For 8" lens spotlights	26.00

No.257

CABLE

Stage cable—listed is exceptionally flexible with numerous strands of fine wires, insulated with a tough braided covering.

Size, B&S No.	Two-Conductor Cap. Amp.	Two-Conductor Price Per 100 Ft.	Three-Conductor Cap. Amp.	Three-Conductor Price Per 100 Ft.
14	15	$7.30	—	—
12	20	12.15	20	$19.00
10	25	15.25	—	—
8	35	24.50	70	37.00
6	50	34.60	100	52.00
4	70	50.60	140	76.00
2	90	72.50	180	108.75

Rubber-covered—listed is two-conductor standard flexible stranded cable, with a tough hard-service all-rubber covering.

Size, B&S No.	Cap. Amp.	Price Per 100 Ft.	Size, B&S No.	Cap. Amp.	Price Per 100 Ft.
16	6	$13.75	10	25	$30.75
14	15	21.00	8	35	55.00
12	20	26.25	6	50	69.50

Asbestos covered—Single conductor extra flexible wire with double covering of unimpregnated asbestos braid.

Size, B&S No.	Cap. Amp.	Price Per 100 Ft.	Size, B&S No.	Cap. Amp.	Price Per 100 Ft.
16	10	$6.70	8	50	$12.30
14	20	7.60	6	70	17.60
12	25	8.50	4	90	25.20
10	30	9.80	2	125	39.75

Borderlight cable—multiple conductor No. 12 carried in stock. Cables of heavier size than above listed also available.

No 400

PLUGGING BOXES

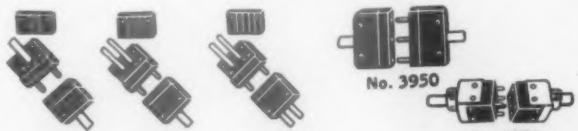
Portable and convenient device for connecting several circuits to single outlet. Plug receptacles mounted in fire-proofed case. Each receptacle independently fused. Feeder cable enters through special clamp. Furnished complete with plugs. Withstands rough usage.

Outlets 2-Wire	2-Wire Main No.	2-Wire Main Price	3-Wire Main No.	3-Wire Main Price
6—30 amp.	400	$30.00	402	$30.00
12—30 amp.	401	58.00	403	58.00
4—50 amp.	404	30.00	405	32.00
6—50 amp.	406	48.00	407	50.00

Supplied with cartridge fuses, unless otherwise ordered
Other arrangements for heavier current demands also available.

CONNECTORS

Two, Three and Four Pole



No 955 No 955AC No 955AA No. 3950 No. 4950

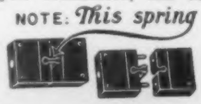
Separable pin-plug type; for portable and other stage lighting equipment. Made in two sections. Male end fitted with brass split pins; female end with brass sleeves. All live parts insulated in solid fibre.

Amp.	Two-Pole No.	Two-Pole Price	Three-Pole No.	Three-Pole Price	Four-Pole No.	Four-Pole Price
5	950	$1.10	3950	$2.40	4950	$5.00
15	955	1.50	3955	3.60	4955	6.00
30	956	2.40	3956	5.00	4956	9.50
60	957	5.40	3957	6.40	4957	14.50
100	958	13.50	3958	19.80	—	—
200	959	25.40	—	—	—	—

NOTE: Two pole connectors listed are for connecting duplex to duplex. For connecting duplex to pair of single conductors add suffix "AC" to catalog number. For connecting two pair of single conductors add suffix "AA" to catalog number Price same as for duplex to duplex.

Spring catch as shown, for 5 to 30 ampere 2-pole connectors, can be furnished at $0.30 each additional.

NOTE: *This spring*



Connectors Nos. 950 to 957 inclusive, 3950 and 3955 are reversible; can be furnished polarized or non-reversible at $0.50 each additional. Connectors with greater number of pins also available.

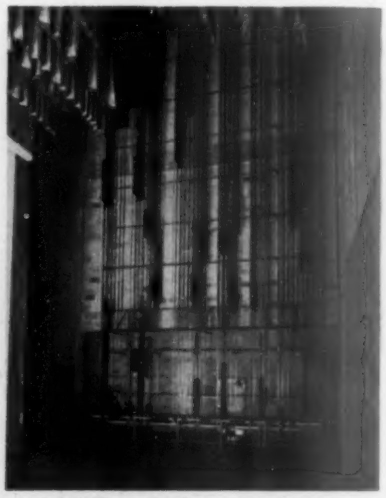
for PERMANENT EQUIPMENT for *Lighting the Stage or Auditorium — write for* BULLETIN NO. 44

J. R. CLANCY, INC.

Syracuse, New York

DESIGNERS AND BUILDERS OF STAGE MECHANICAL EQUIPMENT

Clancy engineers have cooperated with school authorities, architects, and builders in developing plans for large and small auditorium stages. Every item from the front rail of the orchestra lift to the back wall of the stage can be planned for and provided by J. R. Clancy, Inc.



ABOVE: Back stage showing counterweight system

AT LEFT: General view of Purdue University Music Hall Auditorium. Walter P. Scholer, Architect

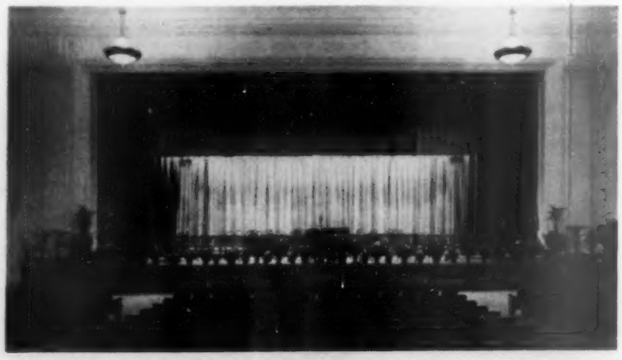
● AN OUTSTANDING STAGE ACHIEVEMENT BY CLANCY

The great Purdue University Music Hall is an outstanding example of skill and craftsmanship in the design and building of stage equipment. A gigantic steel and asbestos curtain weighing 20 tons rises and descends smoothly, quietly, at the touch of a button. Huge border lights, light bridges, sound horns, and curtains are "brought in" and "taken out" with no apparent effort. The great proscenium curtain, over 100 feet in length, gradually parts in the center and glides to the sides of the immense stage. At the press of a button the huge orchestra lift carrying perhaps 100 men and their instruments gracefully rises to orchestra or stage level and the show is on. Back stage huge sound horns, cyclorama, and many pieces of mechanical stage equipment are "brought in" and "taken out" with lightning like rapidity. Everything is planned. There is a place for everything in a structure built for efficiency. Clancy engineers, with a background reflecting years of experience, were proud to work with the architects on this important job. Your stage can be equally efficient if planned and built by Clancy.

● FOR SMALLER SCHOOL STAGES

A modern high school stage at Olean, N. Y., complete in every detail and amply equipped to handle even "road shows" more efficiently than most legitimate theaters. Heavy drops, painted scenery, and all manner of sets are handled quickly, easily, and most of all, safely. Here is real theater atmosphere for the amateur. The students are inspired. The faculty is encouraged. Twenty-five sets of Clancy counterweight equipment, all economically planned and easily operated.

Your new stage can be equipped like this. If you have an old stage to remodel, let us solve that problem, too. We have helped hundreds of others. We can help you through our Clancy Engineering Service.



View of Stage, Olean High School, Olean, N. Y.

Clancy Stage Hardware has been famous since 1885. Order Stage Screws, Stage Braces, Sandbags, Cleats, Rope and Cable, all items constantly in stock ready for shipment. All types of draw curtain tracks with automatic motor controls shipped the day order is received.

I. WEISS AND SONS, INC.

445 West 45th Street, New York City

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Brooklyn Technical High School Stage-Curtains and Drapes made and hung by I. WEISS and SONS, INC.

Specialists in stage equipment for thirty-eight years!

STAGE CURTAINS • ASBESTOS CURTAINS • WINDOW CURTAINS • CURTAIN MOTOR
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THE TABLET & TICKET CO.

1019 West Adams Street, Chicago, Illinois

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SCHOOL ANNOUNCEMENT and BULLETIN BOARDS--GUMMED PAPER LETTERS and TAPE

Illustration shows board installed in Austin High School, Chicago, Illinois

ANNOUNCEMENT BOARDS of this type are invaluable to schools. Board illustrated measures 10 feet long by 4 feet high, has brushed bronze Kalamein (metal over wood) frame, standard broadcloth covered grooved background. Letters are embossed celluloid. Many of these boards have been donated to schools by graduating classes. Write for catalog.

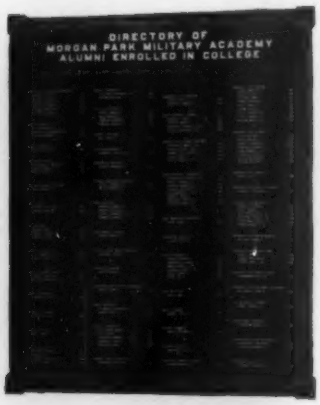


Illustration shows strip type directory installed at Morgan Park Military Academy, Chicago, Illinois

Other items: Menu Racks, Desk Name Signs, Door Plates and Directional Signs. Write for complete catalog.

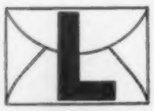
Left: **Frame is ornamental iron finished in black. Panels have bevelled plate glass front for making changes. The strips, ⅜" x 7⅛", are machine lettered with ¼" letters. Write for catalog**

Right: **Frame is extruded bronze, cast bronze heading, individual panels, bronze with bevelled plate glass fronts. Strips are ⅜" x 7⅛" machine lettered with ¼" letters. Overall size 48" x 40". Write for catalog**

Illustration shows strip type directory installed in the Thornton Township High School and Jr. College, Chicago, Illionis

GUMMED PAPER LETTERS, Figures, Symbols and Tape are especially adapted for making flash cards, analytical charts and graphs, signs, indexes, marking files, records, maps, etc.

Three styles available — Cheltenham, Block and Gothic. Furnished white and black die cut from best quality glazed waterproof gummed paper. Sizes ⅛" to 4" high. Special colors cut on order.



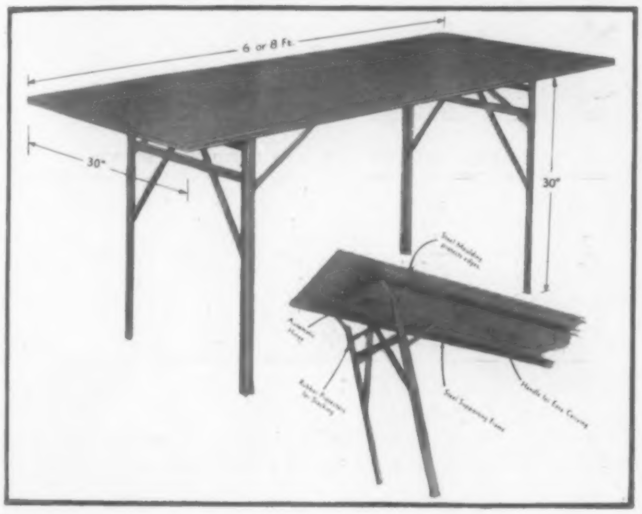
LETTERS AND FIGURES are packed 10 of one character to an envelope or 100 of one character to a box. Symbols are packed in boxes 100 only. Assortments of 1000, 2000 or 5000 characters are the convenient and economical methods of purchase. The envelopes and boxes of individual letters and figures are then purchased as refills when needed for the handy assortment boxes. Write for catalog.

Since 1870

THE BREWER-TITCHENER CORPORATION

118 Port Watson St.
Cortland, New York

Hostess FOLDING PRODUCTS



DELUXE FOLDING CHAIRS

Hostess DeLuxe chairs depart entirely from old time construction principles. Here is a full back and full seat all-steel, all - riveted folding chair, upholstered both back and seat. When folded, the upholstering is between two protecting metal parts that form back and seat, thus eliminating danger of damage to upholstery during storage. Hostess DeLuxe chairs are obtainable in many color combinations and all metal parts are finished in beautiful metallic spray-lacquer colors. All chairs are equipped with large pure rubber feet.

CHAIR TRUCKS

Regular trucks for Hostess chairs are obtainable in two styles. Vertical 24 capacity, and Horizontal (understage) 36 capacity. Constructed of steel with ball bearing casters, swiveled in front only. Special sizes for special installations. Prints furnished upon request.

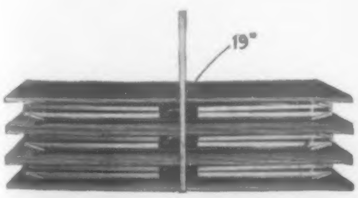
FOLDING BANQUET TABLES

The construction feature of an all-steel frame (Note illustration) gives exceptional lightness with superior strength and rigidity. Frame and legs are of 1 x 1 x 7/64" high carbon angle steel. The legs are spray-lacquered aluminum, and the frame is black-baked enamel.

One man can quickly set them up or knock them down by a simple swing of the legs. The legs operate in units of two. Automatic locking device with positive catch requires no manipulation.

The tops are regularly furnished with beautifully grained ply panel (5 ply graded), finished with two coats of heat and stain resisting hot-spray lacquer. All tops are oil dipped to resist warpage, and all edges are protected with an attractive steel moulding around the entire top.

Obtainable in various sizes including the rounds; also with black tempered masonite and linoleum tops.



Stacks 6 to 19½ Inches

STANDARD FOLDING CHAIRS

The Standard model is a scientifically constructed chair that embodies all the features demanded by architects and school executives. The frame is of angle iron, giving exceptional strength. This X type chair is constructed so it will not collapse, no matter how the weight is distributed.

Seat is of 5/16 inch plywood and protected against chipping by a steel band. Back panel is stamped from 20 gauge steel. All Standard chairs are bonderized before finishing. Furnished only in Brown. All chairs supplied with large rubber feet.

The new improved Standard chair is now obtainable in adjustable heights. This feature allows the Standard chair to do double duty; auditorium height or banquet height. This arrangement is an entirely new development. Details upon request only.

THE BASSICK COMPANY

Bridgeport, Conn.

BASSICK RUBBER CUSHION SLIDES

NAIL TYPE
For Wood Furniture

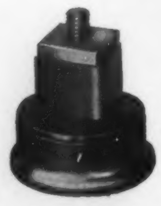
These rubber cushion slides are recommended for chairs, tables and other furniture on hard surfaced floors. They slide easily and quietly without noise or chatter. The sharp steel nail is easily driven into a chair or table leg with a hammer.

Made with heavy gauge, hardened steel base and resilient live rubber cushion to absorb shock. Nickel plated finish. Packed six sets per box or bulk.

CATALOG NUMBERS AND SPECIFICATIONS

Numbers	CG-90	CG-91	CG-92	CG-93
Diameter of Base	7/8"	1 1/16"	1 1/4"	1 1/2"
Weight, Per Set, Oz.	2	3	4	4 1/2
Price, Per Set of 4	$0.20	.25	.30	.35

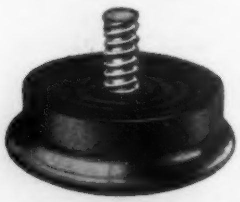
EXPANDING ADAPTER TYPE
For Tubular Metal Furniture



These expanding adapters on rubber cushion slides are furnished in sizes to fit the inside diameter of many tubings now used on metal furniture. The rubber expanding adapter is pliable enough to fit any commercial variations in the diameters of the tubings. They are easy to install, no tools required; the metal base is simply turned by hand until the adapter is a light push fit in the tubing; then pushed into place, and tightened for permanent installation by a few more turns on the metal base. Nickel plated finish. Furnished in bulk only.

CATALOG NUMBERS AND SPECIFICATIONS

Numbers	Diam. of Base	Exact Inside Diam. of Tubing	Approx. Inside Diam. of Tubing	Weight Per Set, Oz.	Price Per Set of 4 Pieces
CG-890–5/8"	7/8"	.527"	17/32"	3	$0.30
CG-890–3/4"	7/8"	.652"	21/32"	3	.30
CG-890–7/8"	7/8"	.777"	25/32"	3	.30
CG-891–1"	1 1/16"	.902"	29/32"	4	.38
CG-891–1 1/16"	1 1/16"	.964"	31/32"	4	.38
CG-892–1 1/4"	1 1/4"	1.120"	1 1/8"	6	.50

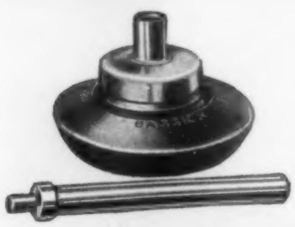


THREADED STEM TYPE
For Metal Furniture

Any of the four sizes of Bassick rubber cushion slides can be furnished with 8-32 machine screws with 3/8" projection above the rubber cushion. Standard finish is nickel plated—can be furnished in oxidized copper finish where required.

CATALOG NUMBERS AND SPECIFICATIONS

Numbers (With Machine Screws)	CG-290	CG-291	CG-292	CG-293
Diameter of Base	7/8"	1 1/16"	1 1/4"	1 1/2"
Price, Per Set	$0.22	$0.27	$0.32	$0.42



NOMAR FURNITURE RESTS

The NoMar Rest is the finest product ever developed to provide adequate protection to floors and floor coverings against the damage of small metal slides and sharp furniture legs. The broad flat base spreads out the weight over a wide area.

The base is brown Atlasite, unbreakable, with neat appearance. Tilting joint keeps base flat on floor when chairs are tilted.

DRIVE-ON TYPE

A patented hollow tube enables the NoMar to be applied in end grain wood of furniture legs not drilled for caster sockets. It gives positive grip and will not loosen or pull out.

SOCKET TYPE

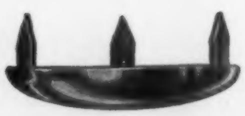
Furnished with standard gripneck sockets, this type is available for replacing casters by merely pulling out the caster and pushing in the NoMar Rest.

SPECIFICATIONS

Numbers	Diam. of Base	Weight Per Set—Oz.	Price Per Set
NR-20	1 1/2"	4	$0.45
NR-30	2"	7	.70
NR-40	2 1/2"	8	.90

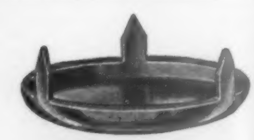
Numbers	Diam. of Base	Weight Per Set—Oz.	Price Per Set
NR-2	1 1/2"	5	$0.45
NR-3	2"	7	.70
NR-4	2 1/2"	10	.90

THREE-PRONG FURNITURE SLIDES



Bassick three-prong furniture slides have been widely used for many years.

A heavy gauge hardened steel base is curved to give easy sliding action and adequate wearing quality. Six sizes available in highly polished nickel plated finish. Packed 25, 100 and 1000 sets per box.

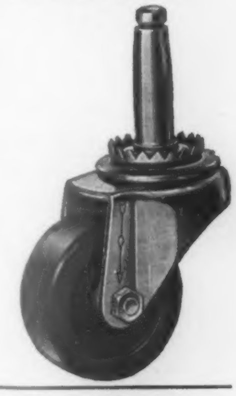


CATALOG NUMBERS AND SPECIFICATIONS
(All prices per 100 sets or 400 pieces)

Numbers	L-35A	L-34A	L-33A	L-32A	L-12A	L-30A
Diameter	3/8"	1/2"	5/8"	3/4"	7/8"	1 1/8"
Price, 25 Sets Per Box	$2.06	$2.20	$2.40	$2.60	$3.10	$4.90
Price, 100 Sets Per Box	1.80	2.00	2.16	2.36	2.90	4.66
Price, 1000 Sets Per Box	1.60	1.78	1.96	2.14	2.68	4.44

BASSICK "DIAMOND-ARROW" BALL BEARING CASTERS

The Ideal Office Chair Caster



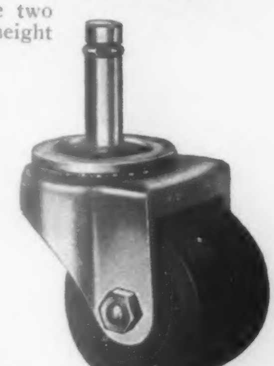
This caster is the highest quality, easiest swiveling, ball bearing caster ever developed for use on office chairs. The "Diamond-Arrow" ball race construction in which one race of ball bearings operate on two levels of hardened steel raceways (changing levels at the neutral areas at the sides where they are not under load) is an outstanding development in ball bearing casters.

These casters are also ideal for use as a heavy duty furniture caster. Furnished complete with gripneck sockets for wood furniture. Packed one set per box. Oxidized copper finish is standard with either "Baco" soft rubber tread or "Atlasite" solid tread composition wheels with self-lubricating bearings.

CATALOG NUMBERS AND SPECIFICATIONS

Numbers	Type of Wheel	Size of Wheel	Tread Width	Weight Per Set—Lbs.	Price Per Set
7696	''Baco''	1⅝"	¾"	19	$1.50
9696	''Baco''	1⅝"	⅞"	23	2.00
7699	''Atlasite''	2"	¾"	19	1.50
9699	''Atlasite''	2"	⅞"	23	2.00

"DIAMOND-ARROW" PIANO CASTERS



Because of the "full floating" easy swiveling action of these two level ball bearing casters and because of the low overall height obtained through this patented construction these double wheel casters are ideal for use in pianos where frequent movement without damage to floors is necessary. Supplied with stem construction for use with No. 66 Socket on pianos already drilled for caster sockets, or with a flat top plate where this type of attachment is more adaptable. The No. 66 Socket has a bottom plate 2⅛" in diameter and requires a $\frac{9}{16}$" bore, 1½" deep.
Supplied with "Baco" soft rubber tread or "Atlasite" solid tread composition wheels with Durex self-lubricating bearings.

CATALOG NUMBERS AND SPECIFICATIONS

Numbers	Type	Type of Wheel	Wheel Diam.	Wheel Width	Overall Height	Size of Top Plate	Bolt Hole Spacings	Weight Per Set—Lbs.	Price Per Set
9006	Plate	''Baco''	2"	1⅝"	2$\frac{13}{16}$"	2¾ x 3¾"	1¾ x 3"	4	$4.40
9009	Plate	''Atlasite''	2"	1⅝"	2$\frac{13}{16}$"	2¾ x 3¾"	1¾ x 3"	4	4.40
9006X2	Stem	''Baco''	2"	1⅝"	2⅝"			3½	4.40
9009X2	Stem	''Atlasite''	2"	1⅝"	2⅝"			3½	4.40
No. 66 Socket								⅝	.40

SPECIAL DUTY SWIVEL AND STATIONARY TRUCK CASTERS

Series "68"

Series "08"

Series "99"

Series "98"

These entirely new swivel casters (series "68") are built with the famous "Diamond-Arrow" two level ball race construction which assures quiet, "full floating" swiveling action. Used in conjunction with the matching stationary casters (series "08") they make an ideal combination for use on light duty service trucks, portable book racks, etc. Available with "Baco" soft rubber tread composition wheels with Durex self-lubricating bearings and removable axles. Also available with roller bearing wheels. 8" size furnished only with roller bearing wheels.

WITH ''BACO'' RUBBER TREAD WHEELS

Wheel Diam.	Numbers	Price Each
2½"	2686	$1.20
3"	3866	1.50
4"	4686	2.20
5"	5686	2.40
8"	8686–2	5.50

Wheel Diam.	Numbers	Price Each
4"	4086	$1.60
5"	5086	1.70
8"	8086–2	4.70

Also available with ''Atlasite'' solid tread composition wheels in same sizes and at same prices as the ''Baco'' wheel casters listed above.

This line of welded steel swivel and stationary truck casters is ideally suited for hundreds of miscellaneous uses because of their quietness and ease of operation. They will stand up under severe service conditions because of the simplified construction and scientific embossings. Available with "Baco" rubber tread composition wheels with roller bearings.

WITH ''BACO'' RUBBER TREAD ROLLER BEARING WHEELS

Wheel Diam.	Numbers	Price Each
3"	3996–2	$3.30
4"	4996–2	3.90
5"	5996–2	4.90
6"	6996–2	5.60
8"	8996–2	7.80

Wheel Diam.	Numbers	Price Each
3"	3986–2	$2.16
4"	4986–2	2.66
5"	5986–2	3.06
6"	6986–2	4.16
8"	8986–2	5.16

Also available with ''Atlasite'' solid tread composition wheels in same sizes and at same prices as the ''Baco'' wheel casters listed above.

Write for complete information and specifications.

FAULTLESS CASTER CORPORATION

DEPT. SU-41

REPRESENTATIVES IN PRINCIPAL CITIES — Evansville, Indiana — CANADIAN FACTORY: STRATFORD, ONTARIO

DOUBLE BALL BEARING CHAIR CASTERS

In the office, the library, the study rooms, Quiet is a golden virtue. Faultless Casters are designed for quiet, smooth operation. Faultless Casters swivel quickly and with minimum effort. For the user, they make possible greater efficiency and contentment. Sturdy construction assures years of economical service. The special double ball bearing swivel caster featured here is finished in oxidized copper to harmonize with any furniture.

Packed in 1 Set Individual Display Carton with Sockets, Copper Oxidized Finish

RUBEREX (Cushion Tread) WHEELS

Style Number	Wheel Dia.	Wheel Bearing	Height, Floor to Track Plate
2478	1⅝"	Oilless	2¼"
2479	2"	Oilless	2⅝"

ROCKITE (Hard Tread) WHEELS

Style Number	Wheel Dia.	Wheel Bearing	Height, Floor to Track Plate
2778	1⅝"	Oilless	2¼"
2779	2"	Oilless	2⅝"

FAULTLESS CUSHION CHAIR GLIDES

Faultless Cushion Chair Glides give double protection. The live rubber insulation protects against jars and vibration; the smooth rounded edges of the glide protect floors from being marred. They are sturdily built of formed hardened steel and will outwear the chairs on which they are used. They are finished in oxidized copper, in four sizes, to harmonize with any style of furniture.

Packed in 1 Set Individual Display Carton, Copper Oxidized Finish

FLEXIBLE CUSHION CHAIR GLIDES

Number	Diameter Base
NRS	⅞"
NRS	1 1/16"
NRS	1¼"
NRS	1½"

CUSHION CHAIR GLIDES WITH MACHINE SCREW ATTACHMENT

Number	Diameter Base
SRS	⅞"
SRS	1 1/16"
SRS	1¼"
SRS	1½"
SRS with nut	⅞"
SRS with nut	1 1/16"
SRS with nut	1¼"
SRS with nut	1½"

CUSHION CHAIR GLIDES WITH SPRING CLIP SOCKET FOR METAL TUBING

Number	Diameter Base	Approx. O.D.
		For Round Tubing
ORS	⅞"	⅞"
ORS	1 1/16"	⅞"
ORS	⅞"	1"
ORS	1 1/16"	1"
ORS	⅞"	1 1/16"
ORS	1 1/16"	1 1/16"
		For Square Tubing
ORS	⅞"	1 1/16"
ORS	1 1/16"	1 1/16"

Specify outside diameter of tubing and whether socket is wanted for round or square tubing.

FAULTLESS FURNITURE CUPS

Packed in 1 Set Individual Display Carton

SQUARE ROCKITE OR RUBEREX FURNITURE CUPS

Number	Size of Opening	Weight Per Set
SDC 1½	1½"	6 Oz.
SDC 1¾	1¾"	7 Oz.
SDC 2	2"	13 Oz.
SDC 2⅝	2⅝"	15 Oz.

ROUND ROCKITE OR RUBEREX FURNITURE CUPS

Number	Diam. of Opening	Weight Per Set
RDC 1⅝	1⅝"	5 Oz.
RDC 1⅝	1⅝"	7 Oz.

When ordering, specify whether Rockite (Hard) or Ruberex (Cushion) is wanted

FAULTLESS DOUBLE WHEEL, DOUBLE BALL BEARING PIANO CASTER

With No. 98 Socket, Copper Oxidized Finish

Style No. Ruberex Wheels (Soft Tread)	Style No. Rockite Wheels (Hard Tread)	Wheel Dia.
BW479-2	BW779-2	2"

SECTION VIII

BUSINESS EDUCATION—ADMINISTRATIVE OFFICE

EQUIPMENT NEEDS IN JUNIOR COLLEGE BUSINESS EDUCATION

By McKEE FISK

The Woman's College of the University of North Carolina

BUSINESS education is of major importance in junior colleges and, owing to the present emphasis on terminal education, its importance is likely to increase. The junior college in this discussion is considered to be any educational institution offering work beyond high school but not conferring a baccalaureate degree. Thus, the junior college includes not only those accredited institutions listed in *The Junior College* by W. C. Eells, but also private or public vocational schools which prescribe high-school graduation for admission, and post-graduate or thirteenth-year programs as recommended by the Committee on the Cost and Character of Education in the State of New York,[1] and as they are functioning in such cities as Salt Lake City and Oakland. Most of these institutions place major emphasis on training for business. Even in the typical junior college offering one or two years of work, business work is more important than any other vocational field. Indeed, in most instances, more students are enrolled in business courses than in all other vocational courses combined.

Colvert's study of public junior colleges is typical.[2] It shows that about four-fifths of all public junior colleges offer work in business. Walter Crosby Eells, Executive Secretary of the American Association of Junior Colleges, corroborates this evidence by pointing out that business is the largest single one of the semi-professional fields in junior colleges.[3] The reasons for this are not hard to find. Vocational business education lends itself readily to the usual school program and is relatively inexpensive instruction. It is white-collar work and therefore appeals to the average college student. Comparatively, the amount and cost of necessary equipment is less than that required in most other types of vocational education. This situation has encouraged many schools and colleges to offer work in business with inadequate equipment or makeshift equipment, which results in inefficient training.

The equipment required for a junior college business department depends upon the functions which the department seeks to fulfill, the community in which the work is done, and, consequently, the courses offered together with their objectives.

Three functions are recognized in junior college business education:

1. The consumer-personal use function
2. The preparatory or introductory university function
3. The semi-professional or vocational function

Consumer-Personal Use Function

The consumer-personal use function is designed to meet the needs of all students irrespective of their occupational plans. It is general economic education, and on the junior college level it probably receives less consideration than do the other two functions.

Although not yet widespread, *consumer courses* are being introduced more extensively. Most of these courses are lecture courses. As far as can be determined, no equipment is being used in such courses. This is unfortunate, because many of the lessons to be learned can be taught much better through certain simple experiments and laboratory work. Charts are also helpful.

Personal use business courses, especially in typewriting, are much more widely taught. The fact that

[1] Francis T. Spaulding: "High School and Youth." McGraw-Hill Book Co. New York. 1938.
[2] Clyde C. Colvert: "The Public Junior College Curriculum." Louisiana State University Press, University, La. 1939. Pp. 98-99.
[3] Personal letter, December 4, 1939.

such courses are not found more extensively is due, in part, to the erroneous belief that persons who have a vocational skill *ipso facto* use it in personal affairs. Another reason for the relative infrequency of personal use courses is the lack of equipment and instructional time. The equipment necessary for personal use courses is essentially the same as that used in vocational courses.

Preparatory Function

Undoubtedly the preparatory function is, in most junior colleges, recognized as most important; at least, most junior colleges offer courses of this nature. Occasionally an attempt is made to combine preparatory and semi-professional courses. According to Shields, this is an unsound procedure.[4] However, for small junior colleges such a dual objective is necessary. That this trend may be encouraged is indicated by the increasing liberalization of universities in their own curricular developments and in accepting credits from junior colleges. The equipment necessary in the preparatory or pre-vocational business courses, therefore, can be the same as that used in the semi-professional program.

Occupational Training

Occupational training—preparation for business on the semi-professional level—is, in theory, the most important function of junior college business education. In practice it is destined to become the largest and most important. Two business fields are usually included in the curriculum—clerical and distributive. Many of the thirteenth-year programs and, of course, private business schools, limit their work to clerical training. An occasional thirteenth-year program, as the one in Santa Barbara, limits its offerings to distributive education.

Vocational business education is organized either as straight classroom and laboratory instruction or as cooperative work—part-time cooperative productive work in business (or school) and part-time classroom instruction. Often both types of programs are offered. Usually the equipment problem is simplified in a cooperative program, since the laboratory is the store or the office in which the student works. Most junior colleges, according to a survey recently completed, believe their equipment is satisfactory—at least for the job at hand. This is more true, however, for the clerical than for the distributive studies.

An analysis of the equipment in use and that desired for the several occupational business courses offered in junior colleges was made of forty such institutions. The institutions reporting were both public and private, offering work of one year and two years in length, and of varying sizes. In general, the teachers are reasonably satisfied with the equipment which is available for teaching clerical subjects. The most expressed wish was for additional office machines. Teachers of distributive education, on the other hand, were desirous of securing additional equipment of all kinds.

Classrooms

Room space assigned to business education in junior colleges is generally not designed or especially adapted for such work. The junior college remains the stepchild of education, and business subjects share space that is not desirable for other uses. For the most part, classrooms are ordinary classrooms which have been converted more or less successfully for the teaching of office and store work. Such things as the shape of the room, the lighting, the storage space, and the relationship of the rooms to each other, make it difficult to cultivate business atmosphere and attitudes.

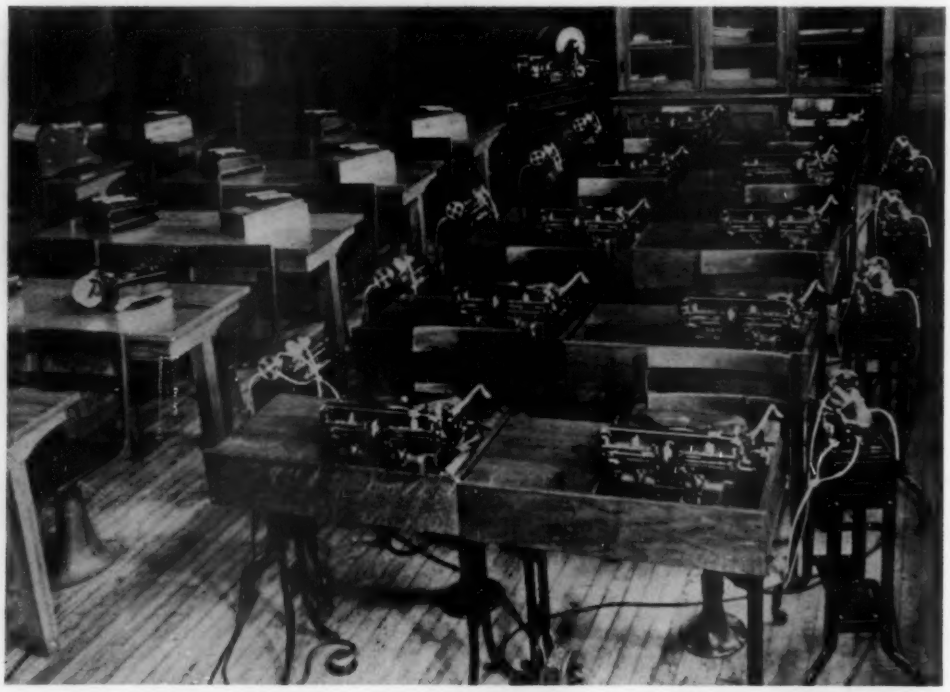
Bookkeeping and Accounting

A large flat working surface is essential for satisfactory work in bookkeeping and accounting. The colleges are about evenly divided in their use of individual desks and tables. Occasionally, office type desks with individual locking drawers are provided. These tables and desks should be of varying heights and equipped with suitable non-folding chairs. It is not customary to provide ink-wells. Adding machines are generally available for use of accounting students. In line with the principle of vocational education to make the work as job-like as possible, adding machines are essential. Machine surveys show that, except for cash registers, adding-listing machines are the most frequently used office machines. Since such machines are used almost universally in office work, prospective bookkeepers should become acquainted with the use of these machines. Where possible, machines with both kinds of keyboards should be used. Ruled blackboards on sliding panels are helpful.

Retail Selling

Distributive work, including selling, advertising, merchandising, store system, display and other related courses, has received great impetus as a result of the George-Deen Act providing Federal aid for this work. Junior college instruction may be subsidized if the work is of "less than college grade," that is, not preparatory to university curricula. Because of the relative newness of such courses in junior collegiate institutions, the equipment situation is neither as satisfactory nor as standardized as for clerical work. Inasmuch as retail selling instruction is usually conducted under the cooperative plan (the federally subsidized program must be so conducted), the need for

[4] H. G. Shields, "Junior College Business Education." University of Chicago Studies in Business Administration, Vol. VI, No. 4, p. 30, 1936.



Machine transcription equipment, Herzl Junior College, Chicago, Ill.

classroom equipment is not as pressing or necessary as in clerical training.

Nevertheless, teachers believe more effective vocational instruction could be carried on if more equipment were provided. In general, these teachers are hopeful as well as desirous of securing more adequate equipment. Most retailing classrooms are equipped with tables, good lighting and considerable bulletin board space as well as storage space for books and pamphlets. Display equipment, including showcases and fixtures, is found more often than any other kind of specialized equipment. Wrapping counters and fixtures are also found to a limited extent. Shelving and garment racks are occasionally found. Other equipment which was reported in use includes cash registers, charge authorization telephones, and marking machines. A few institutions operate student stores, thus providing actual experience for those students who are not fortunate enough to be included in a cooperative program.

Stenography

Stenography includes the three courses of shorthand, typewriting, and transcription.

In addition to a good classroom with sufficient nonglare illumination and blackboards in good condition, little equipment is needed for teaching *shorthand* itself. If the functional method of teaching shorthand is followed, a large amount of good blackboard is required. Some colleges use yellow chalk in shorthand to offset poor blackboards or glaring lights. Arm chairs are not satisfactory for shorthand. Tables or desks are necessary. Where shorthand is taught in the room used for transcription, generally some special type of desk is used. A stop watch is desirable for timed dictation.

Transcription is a course designed to integrate the skills of shorthand, typewriting, and English. Because shorthand without typewriting is of little value, directed transcription is essential in any stenographic program. This requires a room in which dictation can be given and be followed immediately by transcription. Some junior colleges use the regular typewriting equipment in an adjoining room for transcription. Such practice is recognized as makeshift and, as compared with a separate transcription room, is not desirable. However, where budget limitations do not permit two rooms, the typewriting might better be taught in a transcription room than vice-versa. Individual desks are generally used for transcription. This is highly desirable. Several types are available. Some colleges use the popular drop-head desks. Others find the Clemco pedestal typewriter desks better. These desks have a typewriter attachment in place of a tier of drawers in either the right or the left pedestal. Junior colleges which hold typewriting in the transcription room, are finding two-level table type desks suitable. One level is used for the typewriter, the other for taking dictation. Certain standard equipment for both shorthand and typewriting is also included in the transcription room, such as an interval timer, an unabridged dictionary, and a stop watch for dictating purposes.

Owing to its obvious personal use values, as well as its vocational values, *typewriting* is the most popular

business course in junior college as it is in all other schools. Strange as it may seem, not all institutions that offer typewriting have typewriters. Some schools require students to purchase their own machines. Most schools, however, provide machines, either for a fee or free. In the survey all junior colleges but one provided three to five makes of machines, usually in about equal proportions. The one college which had machines of a single make explains it by reporting about 100 per cent placements in one firm. Typewriters are also of different models, standard and noiseless, elite and pica type. Usually typewriters are traded-in every three years. Typewriter desks or tables of varying heights are usual. Occasionally adjustable tables are found. Separate tables for each machine to eliminate vibration are preferred by all junior colleges. Since posture is important in developing a high degree of skill, non-folding chairs of varying heights and of good design are necessary. Other equipment found in junior college typewriting classes includes an interval timer, filing equipment, a stapler, and an unabridged dictionary. Phonographs are found in a few instances. Only one junior college was found to be using dictating equipment in teaching typewriting. No standard procedure was found concerning fastening tables to the floor or typewriters to the tables.

Office Practice

The course known as Office Practice in some schools is known by other titles in other schools. The content of such courses is not standardized and may range

Top — Clemco pedestal desks used in transcription class, Riverside (Calif.) Junior College

A portion of the beginning typewriting room, Armstrong Junior College, Berkeley, Calif.

Left—Group studying filing at Fullerton (Calif.) Junior College

Below—Switchboard and telephone instruction at Fullerton Junior College

from merely another course in shorthand to a course demanding a high degree of skill in some particular office machine. On the other hand, its most important objective seems to be that of providing an integrating experience for students, bringing together as a finishing course all the many office skills and business knowledge previously acquired in separate courses. Four types of office practice courses are discernible.

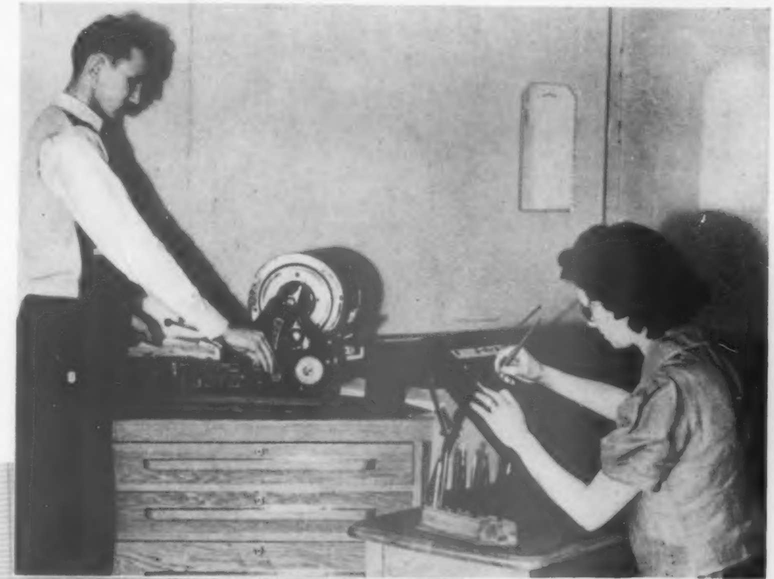
Clerical Practice.—This name is becoming more widely used and indicates an organization of materials designed to prepare students for general clerical positions. Shorthand may or may not be required. The course includes such activities as checking, tracing, simple auditing procedures, filing, handling the mail, and operation of duplicating equipment. A classroom devoted to such activity should be equipped with tables and non-folding chairs. Filing equipment, both individual and cabinet types, is necessary. Cabinet files can be used for instructional purposes as well as storing business forms necessary for use in the class. Suitable guides and folders are of course important essentials to any kind of filing equipment. Most junior colleges provide at least one cabinet file and individual practice filing sets to teach filing. Telephones, with or without private exchanges, are coming into use more widely than formerly. Addressing machines, postage meters, and certain small hand equipment, such as check writers, numbering machines, paper punches, staplers, scales, and paper cutters, is available for use. Typewriters are also included in the clerical practice room. At least one typewriter should be a wide-carriage model. An occasional Varityper and type pacer are found.

Where duplicating work is included as part of the clerical practice course, such equipment is also neces-

sary. The duplicating equipment is usually of two kinds—stencil duplicator and gelatin duplicator. An occasional multigraph or multilith is also found. The latter two machines are generally found where the business department is a production department of the school as well as an instructional department. Where a stencil duplicator is a part of the equipment, a device such as the mimeoscope is highly desirable for stylus work. Gelatin type duplicators are evenly divided into the flat bed and rotary types; the rotary type may be a direct or fluid process machine. Direct process machines are more recent in their development and have not yet been introduced as instructional equipment to any large extent in junior colleges.

Machine dictation is often included in clerical practice courses. The equipment, for the most part, is limited to transcribing machines and sets of prepared records. Most junior college people believe it necessary also to have one or more dictating machines to provide practice in direct dictation and to give practice in transcribing from typical records. A shaving machine is essential if a dictating machine and the regular wax records are used. In the light of the extensive development of machine dictation, it would seem that every junior college which is attempting to give vocational business training should provide dictating and transcribing equipment.

Machine Practice.—Although smaller junior colleges include machine work in a general office practice course, the larger junior colleges which attempt to develop a high degree of skill in office machine work set up separate courses. Two plans are widely used.



Right—A corner of the room devoted to duplicating instruction, University Junior College, Tonkawa, Okla.

Below—Production Laboratory, Fullerton Junior College

Battery plan of instruction with key-driven calculator, as used at Fullerton Junior College

Combined secretarial practice and machine practice laboratory (well adapted for rotary plan of instruction), at Grand Rapids (Mich.) Junior College

Conducting the student bank, Fullerton Junior College

Above—Model office used in integrated plan of teaching office practice, thirteenth-year students in the Hadley Vocational School, St. Louis, Mo. The small cuts on this page show detailed operations carried on in this classroom

Making plates on the graphotype and addressing envelopes on the addressing machine

Making entries in a journal

At work with the invoice and receipt register

Using the check protector

The battery plan is used where the number of students is sufficiently large and the amount of skill required is sufficiently high to demand both intensive and extensive training on the machines. Thus some junior colleges have entire rooms each equipped with one type of machine. It is possible to turn out highly skilled operators for nearly any type of office machine for which there is a demand.

The other plan of organization is known as the rotary plan. A smaller number of machines and a considerable variety are used in this plan. Students are usually given the opportunity to acquire skill on two or three types of machines and during the course rotate from one machine to another in conformity to a prearranged schedule. A rather even distribution of adding-listing machines, and key-driven and crank-driven calculators seems to be the rule in most junior colleges. Where a particular demand has been developed for a certain type of machine operator, as, for example, the key-driven calculator, some junior colleges stress that work more than they do the crank-driven type of calculator.

Of the other types of office machines, the billing machines, bookkeeping machines of various makes and models are used in larger centers. Many small junior colleges have only one bookkeeping or one billing machine and keep it in operation eight hours a day.

Integrated Office Practice.—A relatively recent innovation, but one which is coming into wider use, is the plan of setting up a model office. A regular routine providing for the varied activities that take place in an office, including handling mail, taking orders, answering correspondence, billing and the like, are in-

A well-equipped office practice room, Armstrong Junior College, Berkeley, Calif.

cluded in the instructional procedure. Students are given the opportunity of working a given period in several of the various positions in the office. Regular office equipment, including individual office desks, is provided.

Cooperative Office Practice.—Another plan of providing integration of the various clerical and stenographic skills is cooperative office practice. Under this plan, students who have finished the prescribed program are placed in business offices or school offices where they work in an actual job situation under the supervision of an employer. A teacher-coordinator, who visits the worker frequently and helps him to bridge the gap between the theory of the classroom and the practical aspects of the office, is provided. Cooperative students are usually paid a small wage. If this plan of integration is used, the equipment of the office provides the necessary laboratory facilities for miscellaneous machines, but does not take the place of skill-building equipment.

Criteria for the Selection of Equipment for Business Courses

In summary the following criteria are suggested as being valid for the guidance of those who select equipment for junior collegiate institutions:

1. All business equipment should have a specific relation to the objectives to be achieved.

2. Since most placements are for positions in the local community, a community equipment survey should be undertaken before any large amount of money is invested. This should influence greatly, but not govern absolutely, equipment policies.

3. Not all machines need to be the latest models. Inasmuch as older models of some machines are doubtless in use (as would be shown by the survey), cognizance should be taken of this evidence in purchasing machines.

4. In many instances rebuilt or used machines may serve the purpose as well as new machines.

5. The number of machines of a given type should be governed by the degree of skill it is necessary to acquire, as well as the number of students who are to use the machines.

6. Machines that require some time to learn should be taught in preference to machines that can be learned quickly, as the cash register.

7. Machines which are used in initial positions should be provided before other machines.

8. Those machines that can best be taught in school and not on the job should be provided in preference to other machines.

9. If production is a function of the business department, consideration must be given to that fact as well as to the instructional function.

10. Hygienic and health considerations must be considered in selecting lighting and other furnishings.

EQUIPMENT IN DISTRIBUTIVE EDUCATION

By WILLIAM R. BLACKLER

Research and Teacher Training, Distributive Education, Bureau of Business Education, California State Department of Education

BUSINESS men and educators alike realize the value of providing opportunities for students to gain practical experience while they are attending school. Arrangements have been made in many fields of education for students to supplement school instruction with actual training on the job. One of the earliest training areas of vocational business education in which cooperative training was established is in the retail occupations, in which, as early as 1906, coordinated school and store programs were instituted in Boston.

Recognition of the need for the inauguration of this type of training for students who were interested in the distributive occupations resulted in the establishment of cooperative school-store training under the provisions of the Federal George-Deen Act which became effective July 1, 1937. Cooperative training is one phase of the threefold Federal and state program of vocational education for the distributive occupations, or distributive education, as it is now popularly referred to by business men and educators. In addition to correlated school-store training of high school, junior college and college students, the George-Deen Act makes provision for the organization of part-time and extension vocational training classes for employed or temporarily unemployed workers from the distributive occupations. Distributive occupations are those followed by workers directly engaged in merchandising activities or in direct contact with customers when (a) distributing to consumers, retailers, jobbers, wholesalers and others the products of farm and industry, and (b) when managing, operating or conducting a commercial service or personal service business, or selling the services of such a business.

Model Stores

In the rapid nation-wide development of training for the distributive occupations, many schools have established demonstration and practice laboratories in which students may receive training in store operation and retail selling techniques. School-store projects have been adapted in many ways, ranging from the operation of a complete store serving the students of a large eastern high school to the model store which is set up in the corner or front of the classroom. In many schools the retail training laboratory is completely equipped with the latest equipment of the type used by the retail firms in which the students may later secure part-time and full-time employment.

Although inaugurated originally for training students who were employed in retail businesses, school stores are now utilized in both vocational and general courses in retailing, retail selling and allied subjects. As far as is possible, school instruction and store practice are coordinated. The school is used as a vocational training laboratory for applying the class instruction and for working out individual and group problems and projects. In this way the initial job adjustment of the student to his employment is made easier because of his familiarity with the use of the type of equipment used in modern retail store merchandising. Continued development of this type of combined school and business training of students will undoubtedly make it easier for them to adjust to changing conditions of employment and to become familiar with the merchandising practices of the individual business in shorter periods of time than would be the case if they were unacquainted with store equipment and procedures.

School-Store Equipment

Grocery and department store arrangements are most widely used in school-store projects. Other types of model stores used for training purposes include meat, sporting goods, confectionery, stationery and specialty shops. In some schools the equipment is used for one type of training only and in others it is utilized by groups receiving training in various merchandising fields.

Equipment for the actual or model store is secured from many sources. Included among these are the following: the wood and metal working departments of the school; donations from local retailers, wholesalers and manufacturers and their local representatives; and from a combination of these various sources. It is interesting to note in this connection that in the planning of the layout and in the selection of the equipment of some of the more recently equipped school stores, assistance to school administrators and to instructors was given by local business men and by representatives of equipment supply houses and manufacturers of store equipment.

A good example of the sales training laboratory is

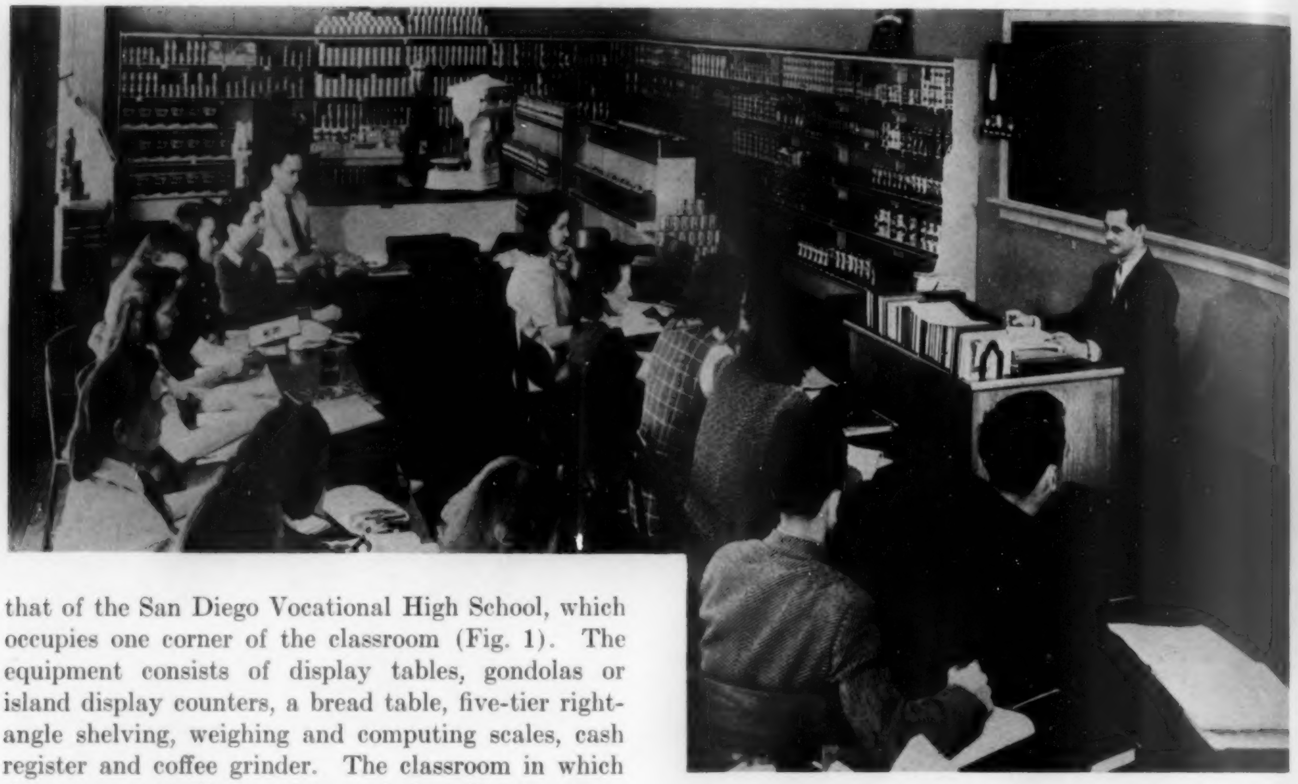


Fig. 1 (above) — Cooperative training group in grocery retailing and selling, San Diego Vocational High School, San Diego, Calif.

that of the San Diego Vocational High School, which occupies one corner of the classroom (Fig. 1). The equipment consists of display tables, gondolas or island display counters, a bread table, five-tier right-angle shelving, weighing and computing scales, cash register and coffee grinder. The classroom in which the grocery retailing equipment is installed serves as a combination instruction and laboratory practice room and is in use continuously throughout the day.

The equipment for the department store training laboratory (Fig. 2) of the same school consists of a wall showcase with glass display windows and top, and cupboards and drawers, five sections of wall shelves, glass display cases with frame back and bottom, wrapping desk with composition top, a U-shaped bargain counter, one cash register, paper rolls, twine cones and Scotch tape machine.

A room 40 x 26 feet has been set aside in the new Colorado Springs High School, Colo., for use as "The Classroom Store" by the Retailing Division of the school. The room borders on a corridor. A display window 13 x 5 feet has been provided for practice in the preparation of merchandise displays by students in the retailing classes. In the front of the room (Fig. 3) open display cases, 12 x 7 feet, and a counter 9 x 3 feet, have been installed for demonstration and

Fig. 2 (right) — Cooperative training group in department store salesmanship, San Diego Vocational High School

Fig. 5—A corner of the sales laboratory in the Central Commercial High School of New York City

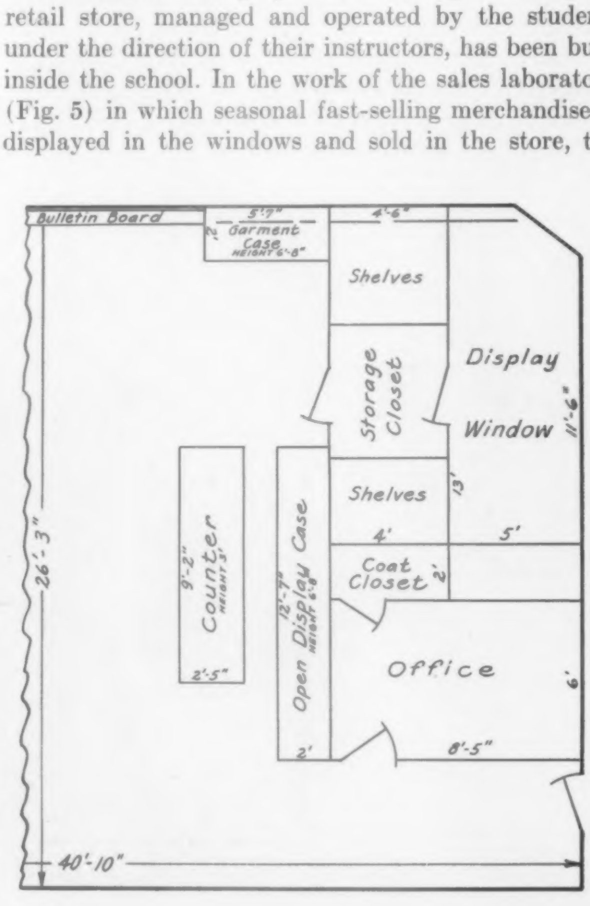
practice in retail selling. This section of the training laboratory is known as "The Classroom Store" (Fig. 4). The room has been planned and equipped to render the maximum service and, in its design and arrangement, the business men of Colorado Springs worked cooperatively with the school architects and administrators.

The success of the retailing and cooperative training program of Colorado Springs High School is attributed by those in charge largely to the splendid assistance given by the stores and business firms of the community. Not only in advising as to the type and arrangement or equipment have the business men given help, but they have also made it possible for students to secure vocational work experience in the stores after school, on Saturdays and during holidays and vacations.

The Central Commercial High School of New York City has for some years carried on a vocational store-training project that has as one of its major objectives "Sales Training by Actual Selling." A complete retail store, managed and operated by the students under the direction of their instructors, has been built inside the school. In the work of the sales laboratory (Fig. 5) in which seasonal fast-selling merchandise is displayed in the windows and sold in the store, the

Fig. 3 (below)—In the Colorado Springs (Colo.) High School a section of the sales-training laboratory is used for "The Classroom Store"

Fig. 4 (right)—Shows how the room has been laid out



students do the buying of the merchandise, make the selection according to color, style and price, write the advertisements, decorate the windows and keep all necessary records.

During the past two years the sales laboratory has been operated as a gift shop, specializing in gifts for birthdays and holiday seasons; a stationery and book store, emphasizing all the necessities for the student; a sports shop, appealing to the seasonal recreational needs of the students; and a notion store, concentrating on inexpensive small wares.

The subjects included in the two-year course, beginning with the eleventh grade, include English of retailing, vocational bookkeeping, health education, salesmanship and advertising, merchandise training, typewriting, English of advertising, window display, store management and economics.

Selecting Equipment

In planning the equipment to be used in retail sales training laboratories it is often necessary to make the plans fit the rooms that are available. In rearrangements of room space and in commencing this type of training it may be possible to install equipment secured by donation or purchase from community merchants. In other situations equipment secured from these sources may be augmented by fixtures and furniture made in the school shops or purchased from equipment supply houses. Many schools have started in a humble, opportunistic way and have gradually developed a store project using the very latest of equipment through continued replacement of earlier fixtures with those of newer design. In the newer school buildings in which sales laboratories are being provided for in the plans, due attention is given to the layout of the room and to the selection and placing of equipment for the greatest utilization by the students.

The amount, type and placing of equipment needed for the school-training laboratory will depend upon

Figs. 6 and 7—Equipment used in retail sales training, Santa Barbara High School, Santa Barbara, Calif.

Fig. 8 (above)—Men's ready-to-wear class using equipment and stock of the J. C. Penney store in St. Joseph, Mo.

Fig. 9 (left)—In Long Beach, Calif., textile authorities conduct distributive education classes in department stores

the rooms available, the type of training to be offered, and the number of different retailing and merchandising subjects that are to be taught in the rooms or adjacent thereto.

In commenting upon the type of equipment that is required for effective instruction in retail practice laboratories, Dr. Kenneth B. Haas, of the United States Office of Education, states: "Project work in connection with classes in retail salesmanship will be maximally efficient only where the physical equipment provided for classroom instruction and for the school store is as complete as possible." Following this statement, Dr. Haas lists the equipment that may be utilized for effective instruction.

Fixtures (permanent).—Display windows for window decorating, blackboards, bulletin boards.

Fixtures (portable).—Fixtures for display cases, display windows, counter displays, floor displays, bookcases, locker supply case.

Machines.—Cash registers, measuring machines, price-ticket machine, adding machines, bookkeeping machine, Charge-Plate machine, duplicating devices, typewriters, paper cutter.

Supplies.—Wrapping paper, twine, bags, tape (gummed), Scotch tape, swatches, teacher's folders for students, merchandise notebooks and workbooks, charts, pick glasses, acids and chemicals, speedball pens, maps, city directory, telephone directory.

Furniture.—Filing cabinets, shelves, counters, desks, display cases, work tables, movable chairs, wastebaskets, clock, mirrors, magazine racks, extension telephones.

Visual-Aid Equipment.—Balopticon, Delineascope, films and slides, projector, stereopticon.

Forms.—Application forms, sales tickets.

Reference Materials.—Sales manuals, manufacturers' manuals, manufacturers' displays, manufacturers' samples, library reference books, trade magazines, fashion magazines, dictionary.

Extension Training in Distributive Education

Under the present Federal-state program of distributive education, vocational training classes are being organized for adult employed workers in distributive occupations. These classes may be held in the day or evening and are designed to provide opportunities for distributive personnel to discuss their common problems with the assistance of a qualified discussion leader and to receive practical instruction on selling techniques, merchandise display, suggestion selling, advertising techniques, store operation and management, and similar activities in the field of distribution. The training programs are under public supervision and control and may meet in a school building, store, trade association or chamber of commerce room, or any other place convenient to the group and the leader.

For those classes meeting in the schools in which demonstrations are carried on before the group, the equipment used is largely obtained from the retailing or sales practice rooms. In some instances, the entire equipment for the demonstration by the instructor

and practice by the members of the training group is brought to the classroom by the instructor.

In other cases, equipment of the stores of the community is utilized by the instructor through cooperative arrangements with the merchants. This is the case with a class in "Effective Selling of Men's Wear" recently held in Saint Joseph, Mo. (Fig. 8). This class met in the evening in the conference room of one of the local men's furnishings stores and received instruction on the sales floor, with the instructor using the merchandise stock and equipment for demonstration sales and for practice by members of the class. Many classes of this type have been held in the nation-wide development of the program of distributive education.

Conference Discussions

For those vocational training groups in which instruction is directed primarily toward the solution of problems confronting the members of the group in their daily work, the conference method is widely used in distributive education. The conference consists essentially of a systematic and somewhat informal thinking-through of the problems of the group with the assistance of a leader who is skilled in conference technique. The experience of the group members is the principal and most important element in the conference situation and forms the basis of this combined group-experience-sharing and instructional meeting. Briefly explained, conference procedure includes the posing of a common problem of the members of the group, the recording of the reactions, suggestions and observations of the group by the conference leader, and, finally, the evaluation of the recorded material both individually by each member and by the combined group acting as a unit.

The equipment used in conference discussions consists of movable chairs for the members, conference tables arranged so that everyone in the room has a view of the conference recording chart and of the leader and a device for recording the thinking of the group. In some conference rooms the blackboard is used extensively. In other meetings a portable blackboard or easel to which is attached large sheets of paper, 3 x 3 feet or larger, is employed during the recording of the reactions of the group to the conference questions. Many conference leaders have found it convenient to have a tripod type of easel that can be carried inside or on top of an automobile constructed so that it can be transported to various group meetings.

Fig. 10—One of a series of conferences with the H. C. Capwell Company, Oakland, Calif. Members of the conference group are divisional managers, buyers, and other executives who are taking up problems relating to department store operation and merchandising

CONVERTING AN OLD SCHOOL BUILDING INTO A CENTRAL OFFICE BUILDING

By GEORGE A. SCHWEBEL

Superintendent, Cicero Public Schools, Ill.

CICERO, a suburb of Chicago, which once contained a great portion of the city, witnessed mushroom growth such as few cities in Illinois experienced. During this time, the little town was affected with "growing pains" and all the problems incident to such speedy increase.

Schools were built in the prairies, only to be enlarged when they were completed. Classes were unusually large, so that sometimes a portion of a class was housed and taught in the morning and the remainder in the afternoon. Half-day sessions were necessary. Portable buildings, basement rooms, and in some cases stores, shops, and church missions, were utilized as schoolrooms.

Little time or attention was given to scientific administration or educational organization during the first hectic years. Naturally, new school buildings followed population centers, and thus some territories were over-built. As years passed and population became stabilized or lessened, the larger and better-equipped buildings amply provided for the needs, thus obviating the necessity for use of smaller buildings.

I shall confine my story to the old Morton Park School building, which was one of four located between 49th Avenue and 57th Avenue, a distance of eight city blocks. The three other buildings provided amply for the care of the students in this locality;

The old building which was originally of classic design has been replaced by one of a modified colonial style of architecture. The portico adds to the attractiveness of the new building

A view of the first floor lobby looking south, as it appears since remodeling, is shown for contrast with a photograph taken during the reconstruction work. Entering from the front, the first floor lobby presents an appearance of stateliness and elegance. The second floor is reached by two winding stairways of beautiful design and artistic setting

hence the abandonment of the old Morton Park School. The administrative duties were carried on in the Cicero School Building, which was the only crowded building remaining in this section.

Now that growth had been stabilized, the curriculum was expanded, the supervisory force increased and departments added, until the business quarters were crowded and interfered with the teaching program in the Cicero School. The question naturally arose: Shall the Board of Education go before the voting public and ask through referendum for a bond issue for an addition to the Cicero School while a nine-room unit is unused only three blocks away? Under the law of Illinois, if an addition or a new building is proposed by the Board of Education, an election must be held for the voters' approval; but if an old building is to be altered, the Board has the legal right to proceed and budget for it.

By moving the business offices out of the Cicero School, no addition was necessary to that building. Since the antiquated and unused Morton Park School was totally inadequate as an administration building because of its original design and plan, the Board of Education wisely chose to remodel it.

Features of the Remodeled Building

First, the needs of a modern educational institution were determined, and plans were included in the architects' draft for a building that would meet those needs. Following are some of the features:

Auditorium for administrative purposes
Committee room
Switchboard and information desk in general office
Private office for the President of the Board of Education
Research office with observation rooms and testing laboratory
Individual offices for all departments of education—

A view of the first floor lobby looking north, as it appears since remodeling, is shown for contrast with a photograph taken during the process of reconstruction. The floor, the side walls, the ceiling, the ornamental doors, the lighting fixtures, all harmonize in a well thought-out and developed plan

Primary, Upper Elementary, Art, Music, Audio-Visual Education, Physical Education, Curriculum Coordinator

Offices for compulsory attendance officer; superintendent; superintendent's private secretary; superintendent of buildings; secretarial help of the supervisional staff

Stockroom for receipt of all shipments for the district, and storeroom for all goods sent to the several buildings

Practice room for band and orchestra

Practice room equipped for physical education

The accompanying "before and after" photographs illustrate the inadequacy of the old building and the utility of the new building.

Some of the special features of this administration building are: rubber tile floors in the general offices; broadloom carpets and velvet drapery in the Superintendent's office, President's office and auditorium; built-in metal cabinets with drawers specially sized for the various forms necessary in administration, etc.; laboratory where the testing can be observed through a mirrored door, and the child taking the test cannot see the tester; testing of this nature gives a more accurate diagnosis when the child is not embarrassed by the presence of the examiner.

In the planning of the building all supervisors and department heads were consulted as to the needs in their offices, location of desk, telephone, electric outlets, type of built-in cabinets desired, and color decoration of walls and ceiling. The architect, A. J. Zelenka, of Cicero, desired very much to have the building function properly as well as comply with the artistic architectural plans.

The Financial Situation

For this new administration building no extra tax levy was made. There was no bond issue made, nor

The Assembly room is used also for the meetings of the Board of Education and as a lecture room for the schools. At the east (or front) end is a large table about which the Board of Education assemble for their meetings. The room will seat approximately 200 people who wish to attend School Board meetings or any of the other functions carried on

was the tax rate increased. Such a situation may never again arise in Cook County.

In 1928 the tax assessment was ruled out in Cook County and a new assessment was ordered by the County Commissioner. Hence, no taxes were collected for more than two years. All school moneys were borrowed on tax anticipation warrants or on funding bonds. When the new assessment was levied and tax bills issued, we were in a period of depression and many taxes were unpaid. Interest and penalties were added; hence there were many defaults and forfeitures.

When taxes again were collected, all back taxes on defaults and forfeitures, upon redemption of properties, were set aside for special use. In the case of the building fund, most of the money was spent on the conversion of the old Morton Park School, and after such procedure for nearly three years the building was completed without a cent of debt upon the Cicero school district.

The public of Cicero, in general, respect and admire the Board of Education for its wisdom and foresight, and for its efforts in making possible a more efficient and modern educational administration.

The Superintendent's office is on the first floor. The outer office is provided with telephone switchboard and all necessary furniture and equipment for the office employees. The private office (shown in cut) is equipped with steel vaults for records and valuable documents pertaining to the Cicero public schools

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Jamestown, New York

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The Postindex Drawer Cabinets are generally accepted as standard equipment for many school record requirements. They are available in capacities ranging from 500 to 2,500 records, depending upon the number of drawers and card size selected. Standard cabinets are available in 6, 7, 12, 13, 19 and 20 drawer heights, and a large variety of card sizes. Any size and any capacity may be provided for in the Postindex line of Drawer Cabinets.

This line of Postindex equipment is especially convenient for quick reference purposes since the proper drawer may be quickly located by the index on the front, and as quickly extended for finding of the card or record desired. Postindex is also fastest for posting purposes as posting is done without taking the form out of the file.

This type of equipment gives an unusually fine appearance in offices where attention to such refinement is desired. A single cabinet or a battery of these cabinets may be put on a roller caster stand so the installation may be rolled to different locations in the office, or up alongside a certain desk, when particularly desired for prolonged reference or posting.

The trays are quickly removed in case it is desirable to temporarily separate one or several trays from the installation for reference and posting at some other location. The standard trays have on an average of 90 records per tray. This varies slightly one way or the other depending upon the size of the card.

Write for Circular

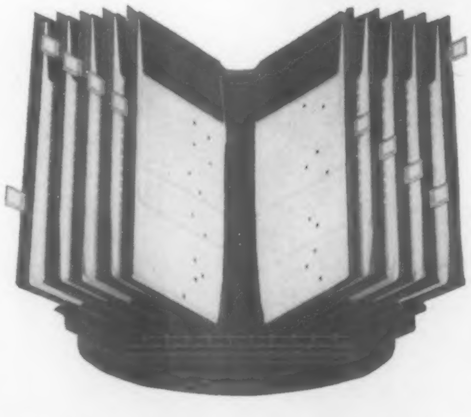
MODEL 5 FLAT BOOKS AND CABINETS

Model 5 Flat Books are most widely used among school administrators because they are readily adapted to either large or small installations and because of compactness and the convenience in handling. Flat Books are easy to post because they lie flat on the desk. A large number of records are seen at one time as an average Flat Book will hold 140 records. The books furnish a fully protected unit to carry about to any part of the building. They lend themselves ideally to housing in safes when not actually in use. Books may be purchased one at a time to add to present installation. Flat books are made of aluminum and very light to handle.

Write for Circular

PROGRAM STAND

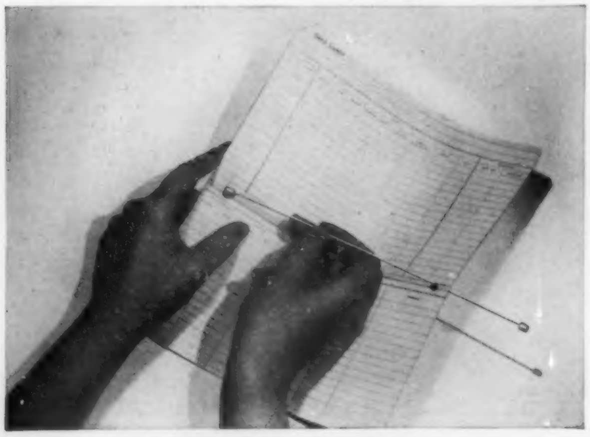
For Indexing of Daily Programs



In junior and senior high schools, and in all other schools having the departmental type of organization, it is considered desirable to have the daily program of each pupil easily available. The program stand illustrated provides for the visible indexing of each child's daily program. Each panel is doubly indexed for rapid reference.

The panels can be removed individually. The sloping standard that holds them is mounted on a rotating base. This construction makes it easy to refer to the records from either side of a counter.

THE SELF-ALIGNING TRUNNION WIRE MAKES POSTINDEX



Slip It Through the Form
Just "thread" the trunnion wire through the two holes in the four-page form. It's done in a split second — for it's the most natural of actions — and small or large forms are handled equally fast

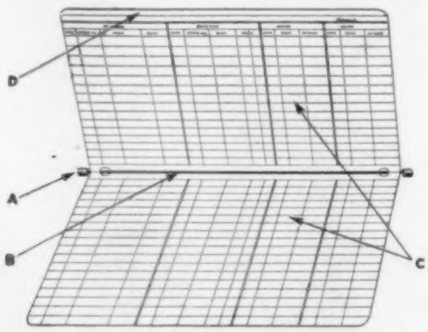
Snap It in Place
Engage the trunnion under the channel ledge. Then, bending the wire slightly — it's oil tempered steel for the purpose — snap the other trunnion in place. It's all done with the proverbial "twist of the wrist"

POSTINDEX FOUR-PAGE FORM

The Postindex four-page form is ideally adapted to many of the various school accounting records because of the great amount of recording space provided. For instance, it makes possible on one form a complete cumulative student record covering scholastic record, attendance, extra curricular activities, intelligence tests, achievement tests and such other related data, so that it is possible for the school administrator to have complete information at hand in connection with child guidance.

All four pages of such a card are independently accessible for posting and reference as the card lies in the file, making it easy to turn to any section of the record desired.

The spring wire and trunnion card-holder provides an ideal means of attaching auxiliary records to the master form in such a way that essential additional information may be had all in the same place about the same subject or student. See Postindex regular catalog for many other features.



THE SIMPLICITY OF THE POSTINDEX VISIBLE FILE PRINCIPLE

A. This is the trunnion that operates in the channel at the side of the panel.

B. This is the anti-rust tempered spring wire card holder. Form may be inserted or removed from panel instantly.

C. This shows two pages of the four-page form, which gives a writing area on an 8 x 5 inch form of 160 square inches, equal to a ledger page of 10 x 16 inches.

D. This shows the visible line where are typed the name and address or the subject of the record.

SLIDES INTO TYPEWRITER

Postindex records can be indexed and prepared for use on any standard typewriter. As soon as the form is indexed it is ready for mounting on the trunnion wire as shown in the illustrations, the form being properly slotted for the purpose at the factory. Each form is also properly scored at the factory for even, easy folding. Thus the forms can be indexed as required at any time. No attachment is needed on the typewriter—or on the card—for indexing purposes, nor does any part of the form have to be torn off after indexing.

DOUBLE INDEX PREVENTS ERRORS

Postindex speeds up the posting, finding and record keeping side of business so tremendously because it is, in itself, such an error-proof system. Thanks to its construction—the hanging of each form from an individual trunnion wire—it is possible to index each four-page form from both front and back. In this way, the index is always visible whether the forms are in the down or upstanding position. This advantage of equally simple "two way" operation is a very real one. As shown by the three positions of the four-page form here illustrated, every part of the record is equally easy to work on, to find or to post. The correct index always in sight safeguards against errors and the time lost in correcting them.

The double index, with 100% visibility at all times, is another important factor in making Postindex the fastest of posting systems. The principle of double indexing is carried on through all phases of a Postindex installation. Each four-page form is double indexed—each tray is double indexed—and each folded insert sheet can also be double indexed, which means greater accuracy as well as greater speed.

THE TRUNNION MAKES THE DIFFERENCE

Postindex is simpler — faster — more flexible and more versatile—because of the exclusive Postindex patented Self-Aligning Trunnion Wire. It's so simple in itself—the trunnion—that its importance cannot be overemphasized. It permits Postindex to operate as no other system can operate. For you will only find the trunnion—with the greater speed and simplicity it effects—in Postindex Files.

THE EASIEST SYSTEM TO INSTALL, OPERATE AND MAINTAIN

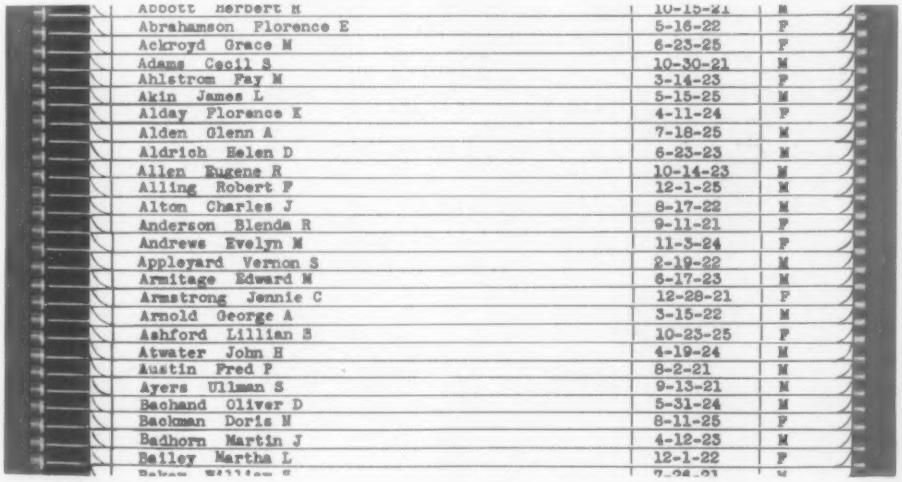
Shift It as You Please

You can remove the units and shift or rearrange them at will. Just pick up the wire, disengaging the trunnion on either side of the channel. And you can shift a handful of forms as easily as a single unit

One Hand Posting
As Only Postindex Gives It to You

Note the perfect lay-back of the forms — because of the trunnion action — which keeps the left hand free for "finding" while the right hand is free for posting

INDEX ALWAYS IN SIGHT AND ALWAYS IN PLACE



As this "close-up" view of a Postindex tray shows very clearly, each form unit is held in precisely uniform alignment and "exposure" with all of its neighbors. Here again, the patented trunnion is directly responsible for a highly important Postindex advantage. For a system cannot be a true time saver when it requires constant re-alignment, adjustment or correction—the kind of attention Postindex does not require.

Note the military precision of the trim-rounded trunnion ends. The shoulder-to-shoulder position of the trunnions makes it impossible for any one form unit to "hide" under the form above or below it. Thus the index line always has 100% visibility—so important for swift fact and figure finding and equally important in posting.

HINGE CLIPS FOR SINGLE CARDS

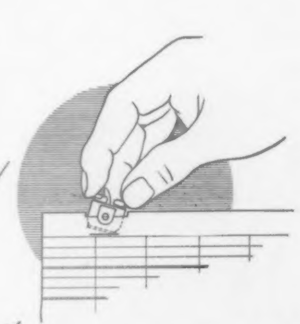
ARTINDEX Hinge Clips are metal tabs of patented design offering unusual facility and freedom of handling. The tongue of the clip engages in a slot in the card or sheet which is thus securely held. The use of the Hinge Clip is clearly illustrated in the diagrams on this page.

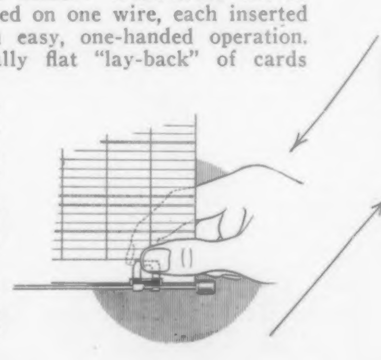
Here are some of the many advantages of this new card holder: Both sides can be posted without removal from holder. Two cards can be used on one wire, each inserted and removed independently. Insertion and removal is an easy, one-handed operation. There's no slipping or tearing out of clips. Exceptionally flat "lay-back" of cards either way.

Your present vertical file can be converted, to give you the many advantages of Visible Filing. And give them to you easily and quickly! The Hinge Clip holder makes this change, without even copying old records or new cards. This saves time—saves money—saves material.

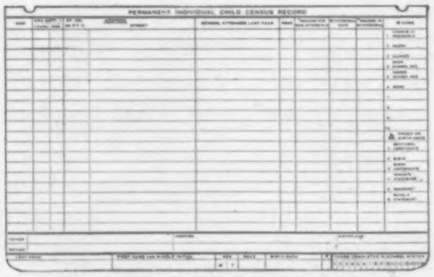
Artindex Hinge Clips slip off easily without mutilation of cards or hinges when cards are to be transferred to a vertical file.

Using the Hinge Clips, the average rate of change-over is a thousand cards a day. Tabs need not cover printing on forms. Ask for a sample Hinge Clip and card, and name the record and quantity you use.

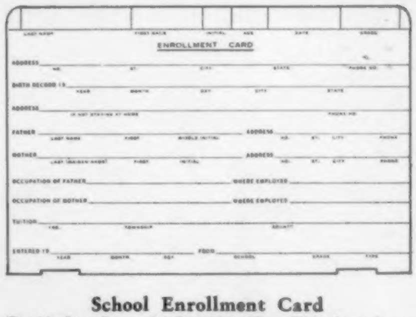




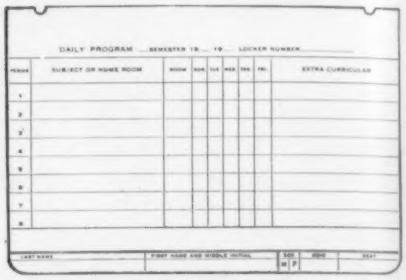
Snap on the Hinge Clip, Cross the Wire and — It Slips Readily Into Place



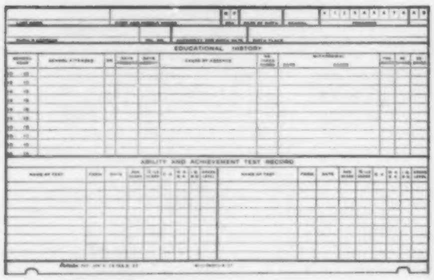
Individual School Census Card
Postindex form 81-C-6385-8. This shows one side of a two-page card which incorporates complete census information and attendance information. The back side of this card shows history of employment



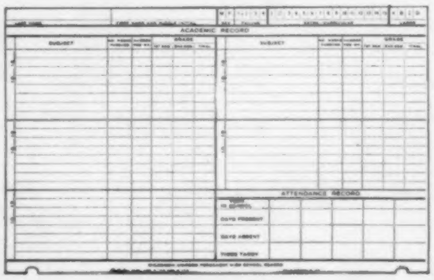
School Enrollment Card
Postindex form 81-B-2916-8P. This is a two-page form with illustration showing the enrollment record. The back side of this same card covers daily program record



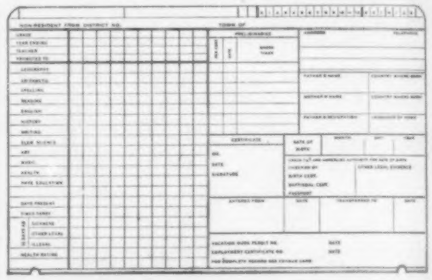
Individual Child's Daily Program
Postindex form 81-B-2913-8. This is a four-page form with illustration showing the daily program for a student. The other pages are devoted to registration information and attendance



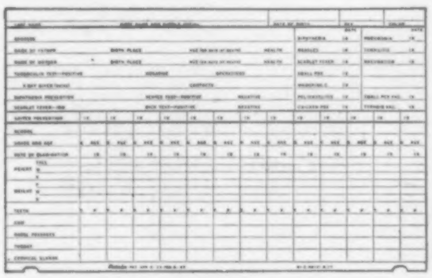
Individual Pupil Cumulative Record
Postindex form 81-C-06072-8CT. This illustration shows one page of a four-page form covering educational history, ability and achievement test record. The other three pages provide for scholarship record and health information



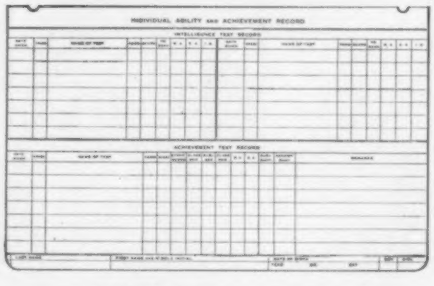
Secondary School Cumulative Record
Postindex form 81-C-05971-8CT. This illustration shows one page of a four-page form with academic record and attendance information. The other three pages provide for general information, extra curricular activities, achievements, with space for intelligence and achievement tests



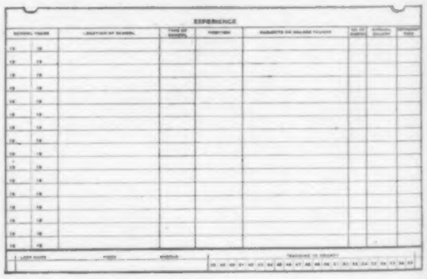
School Cumulative Record
Postindex form C-4077-P. This is a four-page form with illustration showing the elementary scholastic record. One of the other pages covers scholastic record for Junior and Senior High School while the other two pages provide space for recording pupil activities, guidance facts, intelligence and achievement tests



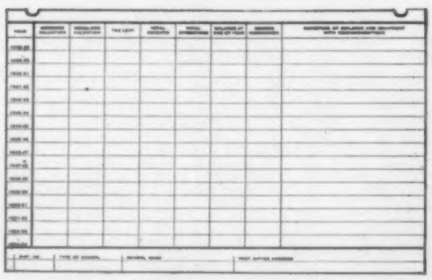
Individual Health Record
Postindex form 81-C-06121-8CT. This is a four-page record with illustration showing a portion of health history. The other three pages are devoted to a continuation of the same record



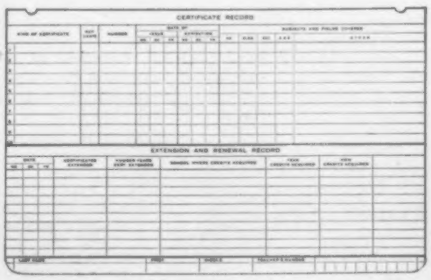
Individual Achievement Record
Postindex form 81-C-6387-8. The illustration shows front side covering intelligence tests and achievement tests. The back side is a continuation of achievement tests



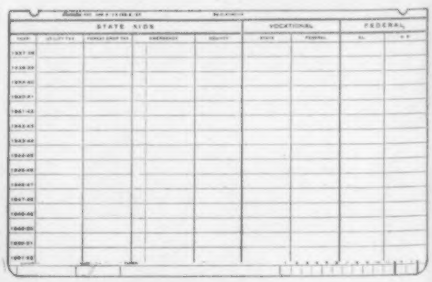
Teacher's Card
Postindex form 81-C-06112-8CT. This is a four-page record with illustration showing teacher's experience. The other three pages are devoted to personal information, educational background, special training and certification, health and general remarks



County Financial Accounting Record
Postindex form 81-C-06111-14CT. This is a four-page form with illustration showing financial record. Other pages are devoted to census, enrollment, attendance and information about board members, also State and County financial support



Florida Form
Postindex form 81-C-6370-8. This is a four-page form with illustration showing the teacher's certification, extension and renewal record. The other three pages are devoted to experience, training and general information



Wisconsin Form
Postindex form 96-C-5740-14. This is a four-page form with illustration showing State Aid data. The other three pages provide record in regard to statistical information, census, enrollment and teachers

ART METAL for the ADMINISTRATIVE OFFICE

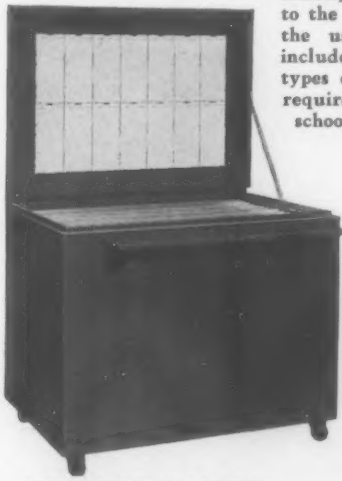
The Art Metal Construction Company, Inc., offers a functional application of its products and services to modern school building situations. The scope of its furniture—from the most modern desks, tables, bookcases, safes and visible files for the administrative office to special equipment for the library, corridor, laboratory, shop lecture rooms and storeroom—is an illustration of its wide interests and services.

VERTICAL FILES
"Director" Files for every standard record in units from desk-high to five-drawer sizes. These highest grade files have lifetime ball-bearing roller suspensions and a new, improved side-lock compressor

ART METAL AIRLINE DESKS
Art Metal's new desk creation is the Airline which has gracefully rounded Island Bases under each pedestal and black artolin top with white satin finish hardware. Airline desks may also be equipped with the new Art Metal Fold-O-Way typewriter device and as in all Art Metal desks, may be exactly fitted to the work of the user and includes all types of desks required in the school office

STORAGE CABINETS
Art Metal Storage Cabinets for all storage purposes come in single and double door widths, also in desk heights and may be had with wardrobe fittings

FIRE SAFES
Art Metal Fire Safes, available in twenty styles and sizes, preserve valuable records against fire or theft. Tested and approved by the Underwriters' Laboratories



ART METAL PLANFILES
The exclusive feature of Art Metal Steel Planfiles consists of compression pockets which hold drawings, tracings, blueprints, in folders—upright, flat and perfectly smooth

BOOKSHELF UNITS
This is the famous Space-A-Shelf unit using the Art Metal library shelf adjustment principle. Detachable end panels are used to save space in batteries of units—especially suitable for schools

MUSEUM CASES
Shown at the left is a recessed wall case about 12 feet long and equipped with semi-indirect lighting which emenates from behind the central pilaster. This case has sliding doors. Cases can also be furnished with doors hinged at the top or side, also with removable panels. A case of this kind is particularly advantageous for displaying educational exhibits

Art Metal flag, trophy and museum cases are of patented dust-tight construction and may be had in table type or free standing cabinets with or without shelves and with glass solid backs for the display of exhibits as required by schools

ART METAL LOCKERS FOR THE SCHOOL

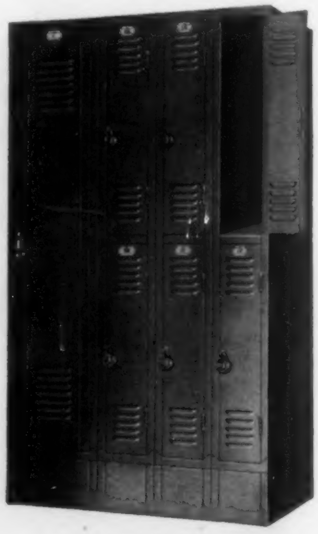
Built on the unit principle, each with its own welded front frame and door of 16-gauge best furniture grade steel. When arranged in groups or back to back, single walls and backs are used; one wall partition between two lockers side by side, or one back between two rows of lockers. The louvres turned inward give full ventilation without projecting beyond the door panel. The vertical V-grooves stiffen the door.

With the new pre-locking feature the locker cannot be left unlocked when door is closed.

All Art Metal Lockers, except compartment lockers, are equipped with padlock eyelets. When spring bolt locks are specified for compartment lockers, padlock eyelets are omitted.

COMBINATION LOCK N. L. CO.
268 Keyless
267 Masterkeyed

SINGLE TIER LOCKER
32 Different Sizes



GYM SUIT LOCKER
27 Different Sizes

COMBINATION SHACKLE LOCK
266 Keyless
265 Masterkeyed

Art Metal Locker Installation, Gaylord Independent School, Gaylord, Minn.

Art Metal Locker Installation, Western High School, Detroit, Mich.

SINGLE TIER LOCKERS Nominal Sizes of Lockers, In.						DOUBLE TIER LOCKERS AND GYM SUIT LOCKERS Nominal Sizes of Lockers, In.						COMPARTMENT		
Width Over-all	Depth Over-all	Height	Width Over-all	Depth Over-all	Height	Width Over-all	Depth Over-all	Height	Width Over-all	Depth Over-all	Height	Width Over-all	Depth Over-all	Height
9	12	60	9	12	72	9	12	30	15	12	36	15	15	15
9	15	60	9	15	72	9	15	30	15	15	36	12	12	12
9	18	60	9	18	72	9	18	30	15	18	36	12	15	12
12	12	60	12	12	72				18	18	36	15	21	12
12	15	60	12	15	72	12	12	30	9	12	42	15	15	$14\frac{4}{5}$
12	18	60	12	18	72	12	15	30	9	15	42	15	21	$14\frac{4}{5}$
12	21	60	12	21	72	12	18	30	9	18	42			
15	12	60	15	12	72	9	12	36	12	12	42			
15	15	60	15	15	72	9	15	36	12	15	42			
15	18	60	15	18	72	9	18	36	12	18	42			
15	21	60	15	21	72	12	12	36	15	12	42			
18	12	60	18	12	72	12	15	36	15	15	42			
18	15	60	18	15	72	12	18	36	15	18	42			
18	18	60	18	18	72									
18	21	60	18	21	72									
18	24	60	18	24	72									

FIRST CLASS
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JAMESTOWN,
N. Y.

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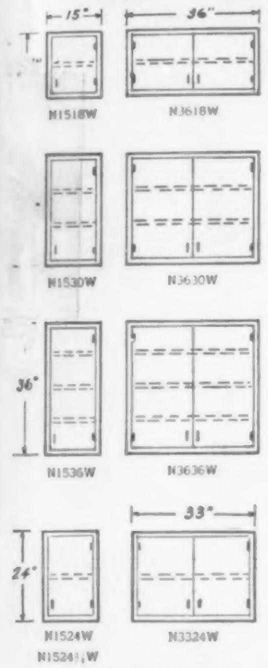
2c — POSTAGE WILL BE PAID BY —

ART METAL CONSTRUCTION COMPANY,
JAMESTOWN,
NEW YORK.

ART METAL FOR THE DOMESTIC SCIENCE ROOM

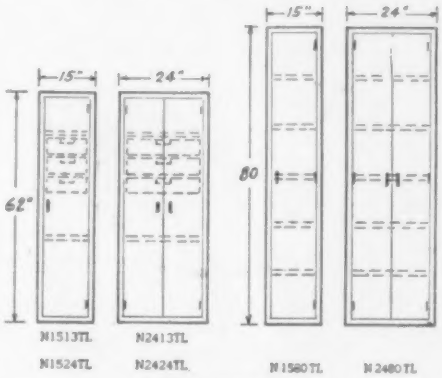
Art Metal standard under sink cabinets meet all requirements of home-making laboratories and they are being installed in a growing list of schools throughout the country. Art Metal also has the facilities for designing special equipment as needed and the services of our consulting staff are available to any school on request.

Art Metal cabinets for home-making rooms are taken from the widest range of types and sizes on the market. They are built for extreme durability and incorporate the most advanced ideas in construction and design developed in 50 years manufacturing experience. Typical units that can be supplied from stock are shown on this page. They are available at intervals of 6″ in width between the extremes of sizes shown. Requests for quotations on special sizes are invited.

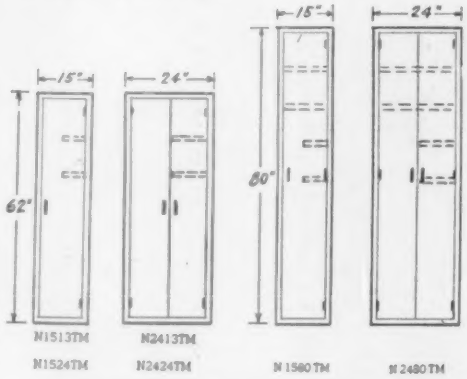


WALL CABINETS

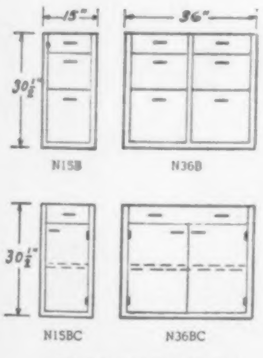
24½" deep



LINEN CABINETS

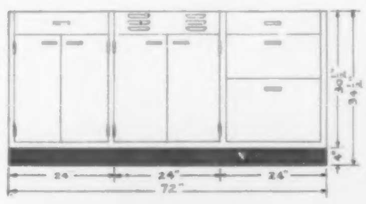


CLEANING IMPLEMENT CABINETS

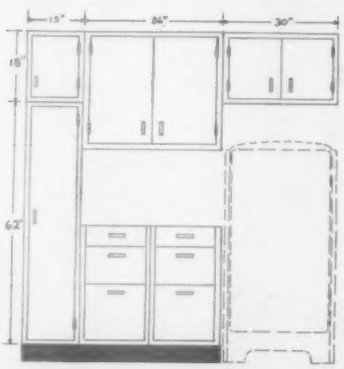


BASE CABINETS

13" deep



TYPICAL ARRANGEMENT FOR AN UNDER SINK CABINET



TYPICAL ARRANGEMENT FOR WALL AND BASE CABINETS

The domestic science room of the St. Louis Park School, St. Louis Park, Minn., is typical of many Art Metal installations. Architects, Haxby & Bissel

Another typical Art Metal installation of a high-school home-making laboratory at Mound, Minn.

ART METAL FOR THE SCHOOL LIBRARY

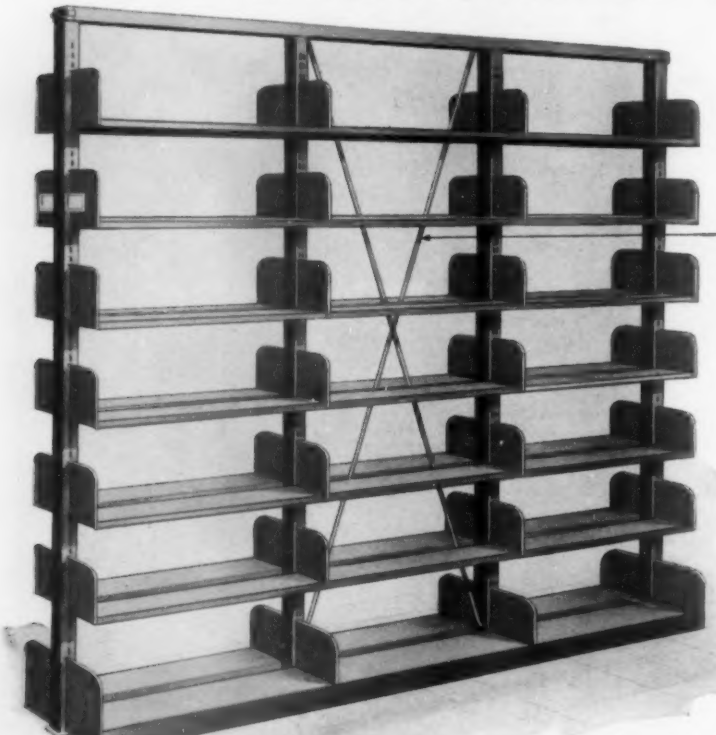
ART METAL "UNITYPE" BOOKSTACKS

Two types of UNITYPE Bookstacks are offered (as shown on this page): Free-Standing Stacks and Top-Braced Units, both models single or double-faced.

The TOP-BRACED bookstack is recommended for locations where it is undesirable to use floor fastenings. Top bracing makes floor fastening unnecessary.

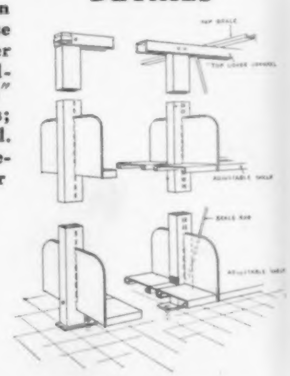
ART METAL EQUIPMENT FOR LIBRARIES INCLUDES

- Standard Type Book Stacks
- Bracket Type Book Stacks
- Bracket Type Rolling Book Stack
- Charging Desks
- Vertical Files
- Stairs and Railings
- Booklifts
- Card Catalog Files
- Reading Tables
- Magazine Racks
- Book Trucks

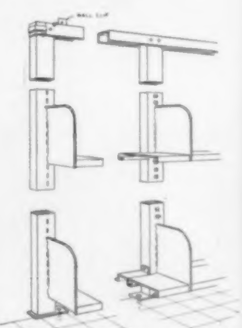


FREE-STANDING UNIT —DOUBLE-FACED
Each double-faced section contains 2 closed base shelves 10″ deep, center dimension; 12 shelves adjustable 1″ on centers 8″ deep, center dimensions; stack 90″ high overall. Each unit must be securely fastened to floor

CONSTRUCTION DETAILS

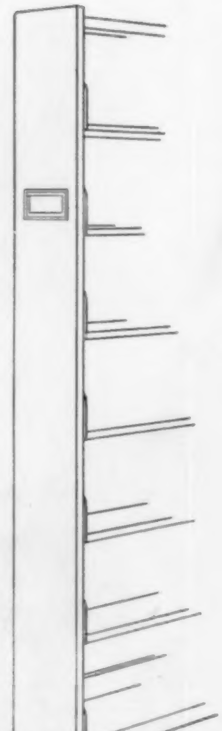


TOP-BRACED STACK— DOUBLE-FACED
Each double-faced section contains 14 shelves adjustable 1″ on centers; stack 90″ high o.a., 8″ deep, center dimension



TOP-BRACED UNIT— SINGLE-FACED
Each single-faced section contains 7 shelves adjustable 1″ on centers; stack 90″ high o.a., 8″ deep, center dimensions

FREE-STANDING UNIT—SINGLE-FACED
Each single-faced section contains 7 shelves adjustable 1″ on centers, stack 90″ high o.a., 8″ deep, center dimension. Fasten securely to floor



ALL-STEEL-EQUIP COMPANY, INC.

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New York, N. Y., 56-58 W. 22nd St.
BRANCHES AND SALES OFFICES IN PRINCIPAL CITIES

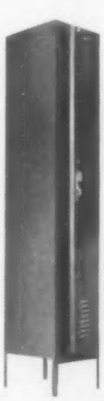
Aurora, Illinois
Chicago, Ill., 326 S. Jefferson St.
Detroit, Mich., 604 Donovan Bldg.

AURORA

LOCKERS, FILES, WARDROBES, DESKS, CABINETS, SHELVING

For over a quarter of a century, All-Steel-Equip Company has built equipment for schools. The economy and durability of A-S-E products have won wide acceptance by architects, engineers and school officials.

A-S-E engineers are men of long experience in the designing and manufacturing of steel equipment. Their services are available, without cost or obligation, for consultation or special designing. There is an A-S-E branch office located near you. Why not take advantage of A-S-E's knowledge and training? They will be glad to help you with any problem.



LOCKERS

A TYPE FOR EVERY WARDROBE NEED

Every school locker problem can be solved by the complete A-S-E line. Smoothness, strength and attractiveness of design are characteristic of these better lockers. Reinforced at all points or sections where wear or damage might occur, they provide extra years of service. The utmost in locker performance is assured by many design and construction features. Live rubber silencers, for instance, on both latch bars and door jams reduce excessive noise. Strong steel frames give rigid support. Attractive in design and finish, A-S-E lockers blend perfectly with their surroundings.

A-S-E Lockers are available in single tier, double tier, box and combination models—for all storage needs. Baked enamel finish in olive green, French gray, school furniture brown. Other colors to order. Send for Catalog No. C31 for complete information.

STEEL CABINETS

WARDROBE · STORAGE · COMBINATION

A-S-E Storage, Wardrobe and Combination Cabinets are made in two complete lines . . . 57 models to meet every school requirement. The MASTER line includes de luxe cabinets, embodying exceptionally high quality. The POPULAR line cabinets are designed to give the maximum value at low cost. A-S-E Cabinets have reinforced doors, secure three point latch, disc tumbler lock with two grooved keys. Bases are completely enclosed. Shelves can be adjusted easily by hand. Standard finish is olive green; but walnut, mahogany, grained oak or French gray may be furnished upon specification. Ask for Catalog No. 177.

PATRICIAN SHELVING

SHELVES QUICKLY ADJUSTABLE

This handsome shelving combines the strength and durability of steel with the beauty of the cabinet-maker's art. Shelves are movable on 1" centers, easily and quickly, without tools. 36" wide sections may be used as single units or in batteries. Easily erected, easily moved. All standard finishes supplied. Write for the complete Patrician Shelving catalog.

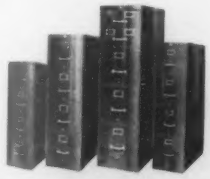
WALL-ROBES

CONTROLLED BY TEACHER

This A-S-E Wall-Robe is the only steel group wardrobe properly designed for elementary schools. It is furnished 54" low for primary grades, providing top shelf accessibility for even the smallest children. 60" high Wall-Robes are available for the middle and upper grades. They are made in several styles for accommodations of two, four or six pupils in each locker. There is individual door operation — yet locking is controlled by one master lock in the end unit. Complete wardrobe includes teacher's and storage units. The installation is economical. May be recessed in the walls in new buildings or placed in front of wall in existing ones. Full information is included in the A-S-E Wall-Robe catalog. Send for it today—ask for Bulletin No. WR-3.

AURORA FILING CABINETS

BALANCED DESIGN



The many models of A-S-E Aurora Filing Cabinets combine to give a range of equipment that covers all school record filing requirements. There are numerous drawer arrangements, sizes to meet each individual need—and prices to fit every budget.

The high quality, beauty, special refinements and low cost have made A-S-E Aurora Files an outstanding favorite with schools and institutions. BALANCED DESIGN makes certain that every feature is on a quality par with every other construction detail. Many plus values distinguish this superior filing and storage equipment: full 28" depth, durable baked-on enamel finish in grained wood or plain finishes; heavy six-post steel frame; smooth drawer operation; side-locking compressor; dustproof enclosed bottom; solid bronze hardware. Send for full information. Catalog C-11.

AURORA STEEL DESKS

TWO STURDILY BUILT, ATTRACTIVE LINES

Smart appearance and accurate construction distinguish A-S-E Aurora Desks and Tables. There are now two sturdily built, exceptionally attractive lines.

The new A-S-E DIPLOMAT Desks have the modern, streamlined appearance so popular in many school and college offices. Rich-looking black linoleum tops—pontoon bases, black trimmed with satin finish, stainless steel bands. Available in light tan, gun metal, olive green metallic-gray or black. Walnut, mahogany or bleached walnut finish at moderate extra cost.

The STANDARD line is of the attractive, conventional, four-leg design. Green linoleum top. Made in olive green or beautifully grained walnut or mahogany finishes.

A-S-E Aurora Desks have won well deserved popularity for workmanship, appearance and durability. Complete details are in the new illustrated Catalog D-12—send for it.

2156A1

THE GENERAL FIREPROOFING COMPANY

Youngstown, Ohio

BRANCHES
BOSTON—714 Beacon Street
CHICAGO—36 S. State Street
CLEVELAND—1235-37 Prospect Avenue
HARTFORD—130 Allyn Street
LOS ANGELES—1733-35 So. Los Angeles Street
MINNEAPOLIS—310 N. First Street

BRANCHES
NEWARK—17 Academy Street
NEW YORK—500 Fifth Avenue
PHILADELPHIA—2301 Chestnut Street
PITTSBURGH—610 Smithfield Street
ST. LOUIS—521-525 Arcade Building
SAN FRANCISCO—1025 Howard Street

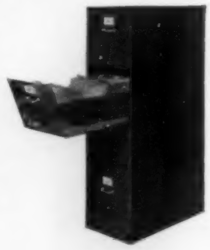
WASHINGTON—201 Mills Building

Dealers Elsewhere. Write for Name of One Nearest You

Metal Office, Classroom and Cafeteria Equipment

(FOR METAL LABORATORY EQUIPMENT See Pages 496, 497)

RECORD FILING EQUIPMENT



Three-, four- and five-drawer Super-Filers for all types of records. The drawers of these cabinets have swing fronts that open as the drawer is opened and close as the drawer is closed, thus providing working space without any reduction of the filing capacity. Greater freedom of filing is secured, many of the ordinary operations of filing are mechanized. 18% more capacity, 25% faster filing. Three-drawer letter and cap files are of counter-height, four-drawer are standard height. The five-drawer cabinets give 48% greater capacity on the same floor space. Supplied with and without lock. No. 5404-L letter size unit as shown takes records up to 12¼" x 11⁹⁄₃₂". No. 5404-C cap-size unit takes records up to 15½" x 11⁹⁄₃₂".

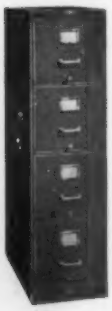
COMBINATION CARD RECORD AND LETTER OR CAP-SIZE FILE

This file has two card index drawers at the top for 5 x 3 or 6 x 4 cards and three letter-size drawers for miscellaneous filing. Ideal for student records as the card record provides a means for cross reference. Also supplied with cap-size drawers.

CARD INDEX CABINETS FOR 5 x 3, 6 x 4 OR 8 x 5 CARDS

A wide variety of card index cabinets from single drawer units for use on top of a desk to twelve-drawer units as illustrated. Ten, eleven and twelve-drawer units for 5 x 3 cards; eight and nine-drawer units for 6 x 4 cards; seven and eight-drawer units for 8 x 5 cards, all in standard 52-inch height cabinets. Cabinets of counter-height also available.

LOWER-PRICED FILES FOR MISCELLANEOUS FILING

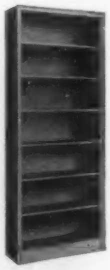


Four-drawer, rigid-front filing cabinets. These cabinets are of the conventional type, having rigid drawer fronts and compressors. Supplied in letter and cap-size, also in bill-size with five drawers. Cabinets of similar grade also available in counter-height units.

SECTIONAL METAL BOOK CASES

Sectional Steel Book Cases. Strong, rigid inter-locking sections of various depths to accommodate books of varying heights. Sections are fitted with clear glass doors that operate on an equalizing mechanism that positively prevents wedging of doors when moved back into the cabinet. Non-warping construction. Bases and tops to match sections. Finished in oven-baked enamel—olive green or grained effects.

ADJUSTABLE BOOK SHELVING



Adjust-a-Shelf Book Units employ the same type of slotted shelf adjustment as standard library shelving of the larger installations. Units are supplied in 84-inch and 90-inch heights, each unit having a base shelf and six adjustable shelves. Adjustment slots are at one-inch intervals. Any number of units may be assembled together to form complete installations.

LIBRARY SHELVING

A special type of shelving for large libraries. Two types—free-standing and multiple-tier. Illustration shows part of an installation for the University of Minnesota. Engineering and consulting service for architects and building committees.

FIRE-RESISTIVE SAFES FOR VITAL RECORDS

Fire-resistive safes for student's records and college accounts. Highest rating of Underwriters' Laboratories for fire protection. Hundreds of cases of severe exposure and perfect performance of these safes attest their dependability. Interiors assembled from stock filing units to meet requirements.

WRITE FOR LARGE COMPLETE CATALOG OF METAL EQUIPMENT

METAL DESKS AND TABLES

Desks of 66", 60", 50" and 45" widths for office or instructor's use. Pleasing design, practical utility, durable construction and finish. Last for years minus repairs and refinishing.

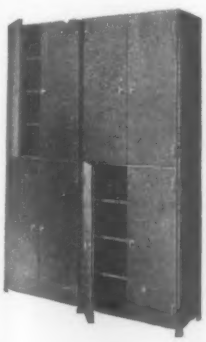
Typewriter desks of 60", 50" and 45" widths for business schools, commercial departments, school offices and boards of education. Full complement of drawers for records, supplies and filing.

Metal Tables for classrooms or offices, matching desks in construction and finish. 72", 66,", 60", 50", 45" and 36" widths.

SECRETAIRE

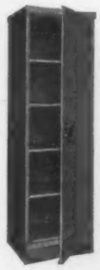
For teachers' records and dormitory rooms. Serves as telephone stand, writing desk, study table. Drawers for manuscript, examination papers, stationery and card records. Space for portable typewriter and pull-out shelf for writing or typing.

STEEL SHELVING FOR SUPPLY STORAGE



Steel Shelving for general supply rooms. Quickly erected or altered to meet any and all conditions of space or stored materials. Skeleton type, semi-enclosed or fully enclosed with doors. Provides systematic and controlled storage of expensive supplies.

STEEL SUPPLY STORAGE CABINETS



Steel Storage Cabinets for classroom or departmental supplies. Adjustable shelves, dust-excluding doors with locks. Combination units for supplies and wardrobe purposes.

Double-door Storage Cabinet with four adjustable shelves. Outside dimensions, 36" wide, 78" high and 19½" or 25½" deep.

Single-door Storage Cabinet with four adjustable shelves. Outside dimensions, 24" wide, 78" high and 19½" or 25½" deep.

STEEL WARDROBES

Single and Double-door Wardrobes for teachers. Also may be assembled in batteries for pupils' wraps. Louvred backs for ventilation, hat shelf and coat rod in each cabinet. Doors fitted with automobile type lock handles. Outside dimensions of single door cabinet—24" wide, 78" high, and in 19½" or 25½" depths. Double door cabinets—36" wide, 78" high and 19½" or 25½" deep.

ALUMINUM CHAIRS FOR OFFICES, CLASSROOM, CAFETERIAS

Aluminum Swivel Chair for teacher's use. Light in weight and easily moved to and from desk. Durable upholstery. Latest type swivel iron and ball-bearing casters.

Side chair companion to chair shown above. Strong, durable, light-weight aluminum construction.

Swivel chair for superintendent's office. An exceptionally comfortable and well proportioned chair. Made of aluminum. Upholstered in durable material. Light in weight. Ball-bearing casters and latest type swivel iron.

Tablet-arm Aluminum chair for classrooms. Strongly built, welded construction. Very portable and easily moved to facilitate sweeping operations.

Also special chairs and tables for cafeterias.

WRITE FOR LARGE COMPLETE CATALOG OF METAL EQUIPMENT

THE GLOBE-WERNICKE CO.

Cincinnati, Ohio

Makers of Over 4000 Items Needed in Offices

Dependable Quality

BRANCH OFFICES
New York .... 76 Ninth Ave.
Chicago .... 367 W. Adams St.
Washington, D. C.
802 Rhode Island Ave. N.E.

IT PAYS TO USE MODERN ATTRACTIVE AND DEPENDABLE GLOBE-WERNICKE EQUIPMENT FOR OFFICES AND LIBRARIES

Enjoy the advantages of modern Globe-Wernicke office and library equipment which enables everyone in your office to accomplish more work with less effort . . . keeps routine operating smoothly, increases efficiency and economy . . . saves time and money.

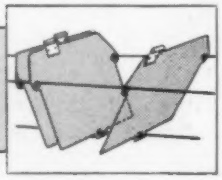
For 58 years this company has been a leader in its field with a reputation for business integrity and prestige which is based on a policy of fairness to employees, our dealers and the public. You will always find Globe-Wernicke products are dependable.

FILING CABINETS

There is a G/W steel or wood file for every business need and price range. Standard inserts may also be had including document file, double box drawer and card index drawer.

Better grades of letter and legal size files have the patented Tri-Guard features . . . an exclusive G/W development.

A "V" shaped filing pocket is created by a touch of the fingers and makes it easy to file or find. Tri-Guard guides slide on three rods which act as a "sway-check" and keep contents of drawer upright without compression.



ANGULAR CELLULOID TAB GUIDES

Tabs are set at an angle of 45°. These index tabs look you straight in the eye . . . they are easy to read, easy to find. There is no stooping nor pushing contents about in order to read labels. G/W angular celluloid tab guides and folders save work, prevent filing fatigue, reduce wear and tear, speed up filing and finding. Inserts are removable, making possible unlimited expansion.

STORAGE CABINETS

Globe-Wernicke steel storage and wardrobe cabinets are made in two grades with a variety of styles and sizes to fit the floor space available and for many storage needs. Contents are kept clean and quickly accessible, losses prevented and privacy assured. They are fire resistant and practically dust-proof.

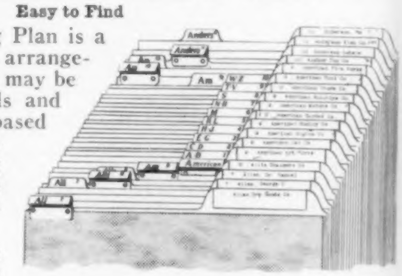
STEEL DESKS AND TABLES

Many exclusive features of construction and design make G/W steel desks and tables very desirable for office and school use. These fine steel desks represent highest standards of quality and combine efficiency, distinctive appearance, durability and long, useful service. They are made in styles and sizes for every office requirement . . . including the new . . . modern . . . celebrated "Streamliner" series . . . an outstanding triumph of design and craftsmanship.

The "STREAMLINER"

G/W SAFEGUARD FILING PLAN

Easy to Read **Easy to Find**



The Safeguard Filing Plan is a simple and practical arrangement of indexing and may be used for card records and correspondence. It is based on 58 years' experience in solving filing problems and can be applied to every filing requirement.

Write for free 8-page circular, which illustrates and describes the Safeguard Filing Plan, the safest, simplest, best and easier way of "filing and finding."

VISIBLE RECORD EQUIPMENT

The Globe - Wernicke visible record system can be used for every record-keeping need to provide important facts instantly. Both cabinets and books are available in various styles and sizes. Signals call attention to matters that require prompt attention. This control system saves time, work and money. Stock or special forms are provided for any type of record need.

EVERYDAY FILES

Handy, inexpensive . . . furnished in eleven styles . . . indexed alphabetically. . . . Made in standard and legal sizes.

"ACCESSO" WOOD DESK TRAYS

Wide hand openings on all four sides and bottom make it very easy to handle papers . . . two sizes.

STEEL CARD INDEX CABINETS

Provide an economical practical method for keeping records . . . one and two drawer sizes . . . for 3 x 5", 4 x 6" and 5 x 8" cards.

WASTE BASKETS

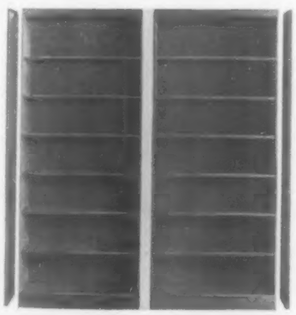
Attractive . . . rounded corners . . . easy to keep clean . . . with or without legs . . . two sizes.

HORIZONTAL SECTIONS

There are numerous kinds of Globe-Wernicke stock steel horizontal filing sections and units may be combined to fit individual requirements. These horizontal sections are light in weight, strong, and easy to intermember or rearrange. There are two standard depths and widths: 17" and 25" deep and 33" and 16½" wide.

STEEL SHELVING

G/W steel shelving provides economical storage service for a business lifetime. It is easy to install and can be adapted to the floor space available. Additional units may be obtained for expansion and shelving can be taken down and reset with 100% salvage. Steel shelving will not burn, does not deteriorate and is widely used in schools and public institutions.



STEEL SLOTTED TYPE BOOK SHELVING

Slotted type book shelf units offer an economical, space-saving method for housing books. Removable end panels permit expansion. Extra units may be added as desired. Units are regularly furnished with six shelves, adjustable every half inch.

BOOKCASES

Globe - Wernicke sectional bookcases are available in several distinctive designs and standard finishes for school, home and office. They combine attractive appearance, convenience, efficiency and economy. Unit includes top, base and book sections of four different heights. More sections are easily added when needed . . . made of wood or steel.

Typical installation of Globe-Wernicke library equipment . . . designed to fit particular requirements of a high school

WOOD LIBRARY EQUIPMENT

If you are planning additions to your school or library equipment, let us help solve your problems.

Globe-Wernicke products include filing cabinets and supplies, steel desks and tables, storage cabinets, bookcases, steel shelving, visible record equipment, office accessories, partitions, stock and special equipment for schools, libraries and public institutions. Write to us for more information.

LYON METAL PRODUCTS INCORPORATED

1334 Madison Ave., Aurora, Illinois

SALES OFFICES IN ALL PRINCIPAL CITIES
FACTORIES: Aurora and Chicago Heights, Illinois

CONSULT YOUR CLASSIFIED TELEPHONE DIRECTORY
PLANTS: Los Angeles, Calif.; New York City, N. Y.

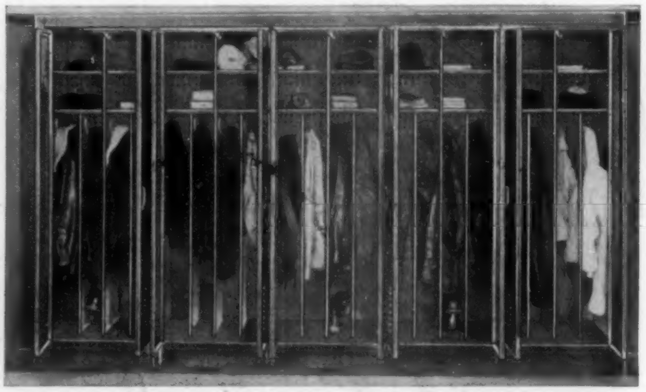
STEEL — Lockers, Folding Chairs, Storage Shelving, Cabinet and Vocational Shop Equipment

FOR forty years Lyon equipment has passed the most rigid requirements of the best school systems. Hundreds of installations made years ago are still giving excellent service and withstanding the daily hard use given them by school children.

Illustrated on this page are a number of Lyon Products required by modern schools. Write for complete catalogs on these and other steel products.

LOCKERS

A type and size for every storage requirement. Write for Catalog No. 233.



LOCKER WARDROBE

One master locking device gives teacher complete control and supervision of pupils' clothing. Many interior arrangements available. Write for Catalog No. 243.

CHAIRS

Seven styles available in a variety of colors and two-tone combinations. Tablet arms, chair trucks and ganging equipment also available. Catalog No. 835.

TOOL CRIB

For safe and orderly storage of all types of tools. Easily adjusted to new requirements. Catalog No. 1557.

STEEL WORK BENCHES

One of many Lyon Steel Shop Equipment items. Available in several sizes — made completely of steel. Shop Equipment Catalog No. 331.

STORAGE CABINETS

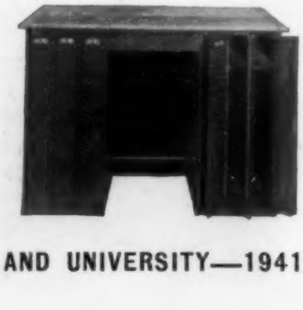
Available in many types and sizes. Write for Catalog No. 421 for complete details.

LOCKER WORK BENCH

Provides storage space under bench top—out of the way. Exceptionally rigid. Ideal for vocational departments. Catalog No. 233.

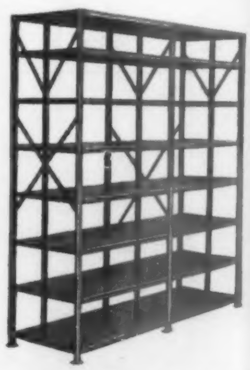
LI-FLAT CABINETS

For flat storage of blueprints, maps, and other large papers. Sectional type —permitting cabinets to be stacked one upon the other. No finishing strips necessary. Catalog 471.



LOCKER DRAWING TABLE

The latest, most efficient drawing table for Engineering Departments. Roomy lockers provided for each student's equipment. Catalog No. 233.



STORAGE SHELVING

Completely standardized and interchangeable. Easily adjusted to special requirements. Catalog No. 118.

METAL OFFICE FURNITURE COMPANY

Grand Rapids, Michigan

FACTORIES IN	BRANCHES IN				DEALERS IN
Grand Rapids Michigan	New York City 604 W. 37th St.	Boston 115 Purchase St.	Los Angeles 923 E. Third St.	Seattle 609 Third Ave.	ALL PRINCIPAL CITIES

STEELCASE
Business Equipment

DESKS AND TABLES

Five grades of desks and tables, including the modern roll edge type with island base, are available for every office requirement. Made in a complete range of types and sizes. All are attractive, efficient, economical and will give a lifetime of service.

SECTIONAL EQUIPMENT

Adaptable to large offices or to small departments or offices where requirements are limited to no more than a single letter file and a card index file. Extreme flexibility of wide and narrow sections permits additions to serve every need.

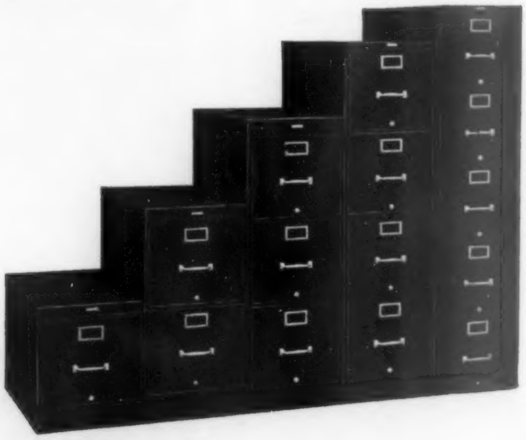
BOOKCASES

These glass door bookcase sections are substantially constructed units, carefully designed and built. Doors are of disappearing type, dust-proof with equalizing device. Three heights, with top and base, intermember perfectly, permitting easy expansion.

Built-to-Order Equipment

Display and Museum Cases

Write for Details



FILING CABINETS

Steelcase files are made in several grades of construction, in suspension and non-suspension types, in various heights from 5-drawer down to single drawer units, in a drawer arrangement for every purpose, in attractive and substantial finishes.

STORAGE CABINETS

Twenty-one sizes and styles of cupboards and wardrobes provide a stock unit for every storage requirement. They are attractively finished, strong and sturdy in construction and very convenient and adaptable in use.

SHELVING

Three types of steel shelving provide the proper kind for use wherever shelf storage is required, whether in libraries where an attractive appearance is necessary or in store-rooms where heavy loads require reinforced shelves.

CHAIRS

Steelcase "Easyrest" chairs offer all the advantages of comfort, long life, beauty and efficiency. The Posture chair may be correctly adjusted in one operation by the occupant while seated. The resilient spring back may be locked into a rigid position at will.

METAL OFFICE FURNITURE COMPANY

Grand Rapids, Michigan

BRANCHES IN

FACTORIES IN					DEALERS IN
Grand Rapids Michigan	New York City 604 W. 37th St.	Boston 115 Purchase St.	Los Angeles 923 E. Third St.	Seattle 609 Third Ave.	ALL PRINCIPAL CITIES

STEELCASE
Business Equipment

TERRELL STEEL LOCKERS

4 ADDED ADVANTAGES AT NO EXTRA COST

Adaptability
A complete range of sizes and styles meets every need of school or gymnasium. Any grouping of full-height, double-tier or box lockers can be supplied.

Safety Handle
All fastening points are concealed in handle. Pilfer-proof, since handle cannot be pried off. Padlock eye is also concealed in handle.

Latching Bar
No meddling possible because the bar is of channel formation and fits into the formed channel on the door. Single tier locker doors have three latching points, double tier have two.

Pre-Locking Device
Positive in operation, pick-proof, simple in design. When door is opened, padlock may be replaced and locked, or key turned, then when door is closed it is automatically locked. This device also permits the use of automatic combination locks.

Silenced Operation
Soft molded rubber bumpers are securely riveted and tenoned into door jambs. Similar bumpers silence latching bars.

Sturdiness
Rigid construction, all welded frame corners. All door corners welded. These and other features add to the strength of the lockers.

Locker Legs
Independent of locker bodies—legs can be spaced two, three or more lockers apart to simplify floor cleaning.

Appearance
Attractive finishes, no weld marks, rust-proof bolts (none on fronts), concealed hinge-pins—these enhance the appearance of Terrell Lockers.

STEEL BOOK STACK UNITS

Here is modern steel book shelving in its best and simplest form—designed and built for the utmost in service for educational institutions.

Easily planned — easily installed—very reasonably priced.

Book Stack Units can serve you as efficiently as they are serving many other leading universities and schools.

SIMPLIFIED, MODERN STEEL BOOK SHELVING

Simplicity
Sold as units, no complicated parts to figure. Intermembering units (of varying widths if required), with duplicating parts omitted, match perfectly in building an assembly.

Sizes
Offered in an assortment of sizes—widths 30", 36", 42"—depths 9", 12"—heights 6' 6", 7' 6", 8' 6".

Capacity
These Book Stacks will accommodate 10% more books than sectional glass door bookcases of the same height. Rounded front posts give maximum shelf width.

Flexibility
A combination of sizes for any space. Shelves adjustable every inch for books of any height. Easily and quickly rearranged.

Strength
The construction of upright posts, tops, bases and shelves insures strength and rigidity in every part. No sagging of shelves even under the heaviest load.

Protection
No rough bolts or raw edges of steel can come in contact with books or hands. Front edge of shelf is triple-flanged for added protection.

Beauty
Designed, built and finished to harmonize with the finest furnishings. The attractive cornice top adds a touch of conservative artistry to each unit.

SECURITY STEEL EQUIPMENT CORPORATION

Avenel, New Jersey

DEALERS IN ALL
PRINCIPAL CITIES

Security
STEEL

"SUPERIORITY IS
INHERENT IN ALL PRODUCTS"

Desks and Tables

2 LINES -- 3 DIFFERENT LEG ARRANGEMENTS

PERIOD PRESIDENTIAL LINE

4 Legs

6 Legs

8 Legs

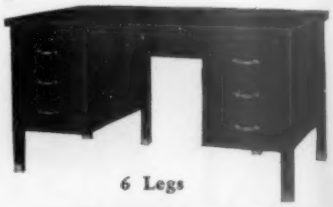
SECURITY Steel Desks and tables have proven beyond doubt their economical advantages in modern offices that reflect prosperity and success.

Both the Standard and Presidential Lines offer a wide range of models embracing every office need. Working convenience and capacity to handle work smoothly and swiftly are inherent in the design of these desks. Each model is built to fit the work to be done upon it—and to assure faster work with less fatigue and fewer errors.

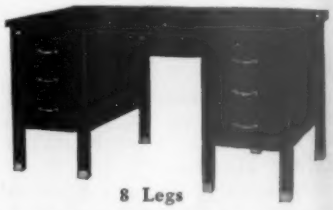
Because of the indestructibility of steel from normal use, long life is assured, eliminating the expense of constant servicing and reducing depreciation to the minimum.

STANDARD LINE

4 Legs



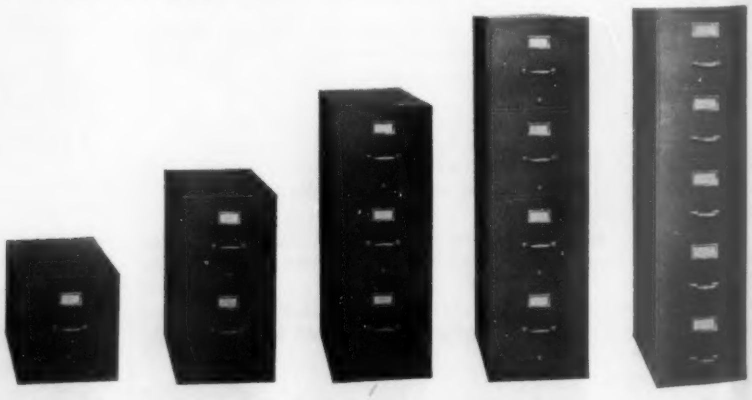
6 Legs



8 Legs

Filing Cabinets

VARIOUS GRADES
ONE TO FIVE HEIGHTS



Various Grades—one to five heights—for letter and legal size sheets, with a complete assortment of substitute drawers for standard sized cards, checks, documents, legal blanks, etc., make possible a flexibility to fit any and all filing requirements. Used singly, or in batteries, this equipment combines good looks with that ability to render a lifetime of service, under ordinary conditions.

COUNTER HIGH FILING CABINETS

SECURITY STEEL Counter High Filing Cabinets effectively partition office space for reception of visitors and transaction of business. This equipment effects real economy. It conserves floor space and reduces work by keeping records immediately available. The cabinets can be equipped with individual or continuous tops covered with battleship linoleum bound with bronze binding. Files are equipped with bronze handles and label holders. The arrangement of this type of cabinet is almost unlimited.

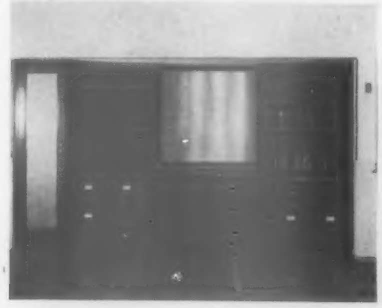
WARDROBE CABINETS

The double wardrobe serves well as either a private locker, or as a group wardrobe for an office. Wearing apparel and personal effects are kept clean and out of sight. The full width hat shelf and coat rod are adjustable without the use of tools. Wardrobe cabinets can be transformed into storage cabinets at any time by removing coat rod and adding shelves.

STEEL SECTIONAL BOOKCASES

SECURITY STEEL Sectional Bookcases with receding glass doors protect treasured volumes in office or library. Doors will positively not wedge when moved back into cabinet. Bases and tops to match sections. Additional sections may be added any time.

PLANNED EQUIPMENT



Special SECURITY STEEL installations engineered by Security experts to fit individual needs. Federal, State and Municipal Governments, banks, public utilities, schools, universities and nationally and internationally known business concerns are profiting by Security Planned Equipment Service.

A complete survey of your particular equipment problem or assistance to architects and building committees will be made by our experts with no obligation.

STORAGE CABINETS

Every business has need for one or more SECURITY Steel Storage cabinets for protecting the thousand and one articles incident to the maintenance of its business. They save valuable floor space, and the time of employees by providing a practical plan of centralized storage, filing and display for business records, merchandise, equipment, and supplies.

MISCELLANEOUS ACCESSORIES

A complete survey of your particular equipment problem or assistance to architects and building committees will be made by our experts with no obligation.

Many additional items of enduring SECURITY STEEL are available, even though not shown on these two pages. Write for information pertaining to products in which you are interested.

FRED MEDART MANUFACTURING CO.

3568 Dekalb St. St. Louis, Mo.

Manufacturers of

Steel Lockers—Steel Wardrobes (The Lockerobe)—Steel Shelving Gymnasium Apparatus—Basketball Backstops—Telescopic Gym Seats Automatic Electric Scoreboard and Timer

STEEL LOCKERS

"Standard of Comparison," the title by which Medart Lockers are widely acknowledged both in the industry and among knowing buyers, is fittingly applied. . . . "Medart" has long served in the role of pioneer in the Locker manufacturing field and as a result, most of the details common in all lockers today first appeared as part of a Medart Locker. . . . All lockers are not alike. . . . In the current model, "Medart" includes a number of exclusive and desirable features that merit the careful consideration of the buyer. Compare!

Write for Locker Catalog L-7

STEEL WARDROBES
The Lockerobe

Space wasting cloakrooms and less efficient wardrobes are rapidly giving way to the modern thought in elementary school wardrobe equipment — The Medart Steel Lockerobe. Lockerobes require a recess depth of only 16 inches! One of the most important of the several functional advantages of Lockerobes, which is of special interest to school officials, is the system of simultaneous door control as provided by "Medart." Supervision of the wardrobe doors is reduced to a minimum. The teacher or a monitor quietly opens and closes all wardrobe doors by the simple operation of one pair of doors. Complete details upon application.

Write for Lockerobe Catalog LRM-4

STEEL SHELVING

Books, classroom supplies, etc., are stocked better, inventoried quicker, and distributed faster when the storeroom is equipped with Medart Steel Shelving. . . . Easy to install, safe to use, and readily dismantled (all parts are interchangeable) for future rearrangements. . . . Medart Steel Shelving fully conforms to the exacting specifications of the Federal Government. . . . Complete engineering service available to interested parties without obligation. . . . "Let Medart lay out your stockroom equipment requirements."

Write for Shelving Catalog S-7

PENN METAL CORPORATION OF PENNA.

46 Oregon Avenue, Philadelphia, Pa.

SALES OFFICES IN PRINCIPAL CITIES

1869 Penco

IN BUSINESS CONTINUOUSLY SINCE 1869

STEEL LOCKERS -- STORAGE and WARDROBE CABINETS STEEL SHELVING -- LOCKER ROOM BENCHES and BASKET RACKS

The Penco Combination Cabinet—Type 3618C, 36" wide, 18" deep and 78" high. Many other styles and sizes of cabinets available

PENCO STEEL PRODUCTS have been time-tested and demonstrated to be satisfactory in thousands of school, university, business and industrial installations.

There is a type of Locker for every school need. . . . Storage and Wardrobe Cabinets for shop, office and teachers' use. . . . Shelving for stock rooms, laboratories and shops.

Closed-Type Plain Shelving with Doors. Two units shown, each 36" wide, 12" deep and 8' 3" high. Other shelving combinations include — plain or ledge types, open or closed, with or without doors. Sizes and reinforcements for every purpose

The Penco Basket Rack—Built in convenient widths and heights to accommodate various quantities of baskets

Penco Two-Person Lockers are space savers. Group of three shown, each 15" wide, 21" deep and 72" high

In the manufacture of Penco equipment the best materials obtainable are combined with careful workmanship to produce strong, durable units of heavy gauge steel that are attractive in appearance and practical in design. You can specify and purchase these products with absolute confidence and assurance of satisfaction . . . they are guaranteed.

Penco engineers are able to point out economies in the selection of equipment, its layout and its use. This service is available without charge or obligation.

Write for further information and complete specifications

Catalog No. 45 Series E—Steel Shelving
Catalog No. 46 Series F—Lockers and Cabinets

The Penn-Joyce Tool Cabinet—Type 34-T, 24" wide, 16" deep and 36" high. Several other styles available

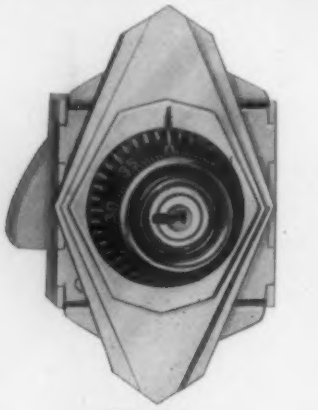
NATIONAL LOCK CO.

Rockford, Illinois

BRANCH OFFICES

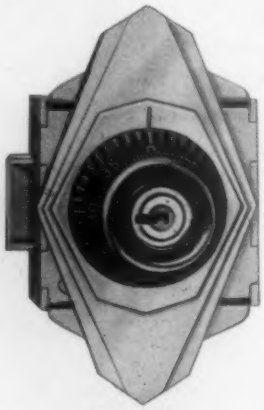
Chicago	Detroit	Houston	Milwaukee	St. Paul
Chattanooga	Evansville	Indianapolis	New York	San Francisco
Cincinnati	Grand Rapids	Jamestown	Portland	York, Pa.
Cleveland	High Point, N. C.	Los Angeles	St. Louis	Toronto, Ont.
		Martinsville, Va.		

ROCKFORD COMBINATION LOCKER LOCKS are available for standard Steel Lockers of any style or make. It is the complete line assuring the utmost in security, convenience, simplicity and durability. Rockford Locks have proven their worth in hundreds of Educational Institutions. For simplified and complete supervision and control select the Rockford Line.



NO. 267

Master Keyed Combination Self Locking, for use on Lockers having spring latch bar. Over 64,000 different combinations available. No bolt or rivet heads visible from outside. Can also be furnished without Master Key feature.



NO. 269

For use on Box type Lockers having no latch bar. Lock has beveled spring bolt. Closing door locks lock and spins dial concealing last figure of combination. Furnished with or without Master Key feature.

NO. 271

Master Keyed Combination Dead Bolt Lock having square end dead bolt. Lock does not have self-locking feature. Combinations of this lock and Nos. 267 and 269 can easily be changed by removing escutcheon plate and turning dial.

COMBINATION SHACKLE LOCKS

NO. 265

Keyless Combination Self-locking Shackle Lock that is fool proof, secure and durable. Inserting shackle upsets combination by turning dial. Must be completely re-dialed to open. Over 64,000 different combinations available. This is a very popular lock in the Rockford Line. Lock case is Chromium Plated and dial is black with white figures.

NO. 264

Master Keyed for ease and convenience of supervision. Can be Master Keyed with all built-in Locks shown above, or Laboratory Lock shown below. Students operate lock by combinations, while officials gain access by use of Master Key. Dial is locked against rotation when shackle is open.

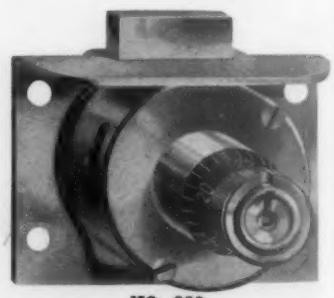
NO. 275
COMBINATION SHACKLE LOCK

Where Locks are purchased by School authorities to be sold on a no-refund basis, this Lock is suggested. The finish is Baked Aluminum and Varnish, a very attractive item, and all mechanical parts of any importance are made of Brass. Parts requiring extra strength are made of Steel, Cadmium Plated and are completely rust-proof. The shackle is self-locking and there are over 64,000 combinations available. Dialing is ratchet or click type permitting rapid operation and the large numerals are easily read, even in dark corridors or locker rooms. This is a full-size Lock of special value and should be re-sold to the students at 10¢ to 25¢ more than the actual School cost.

NO. 275

NO. 259
COMBINATION DRAWER LOCK

Combination Master Keyed Laboratory Drawer or Door Lock. Combination can quickly be changed without removing lock from mortise. Lock is of Solid Brass construction and is not affected by ordinary Laboratory fumes and acids. Lock is reversible for use on right or left hand doors.



NO. 259

Illustrated here are only a few of the many School Locks available in the Rockford Line. Ask for illustrated folder showing complete line.

THE YALE & TOWNE MFG. CO.

TRADE **YALE** MARK — Stamford, Conn. — TRADE **YALE** MARK

INTRODUCE **true economies, maximum security and increased efficiency in locker rooms with these Yale Combination Locker Locks. They supply a degree of protection heretofore unavailable in locks of this type for locker use; security which discourages temptation, aiding in character development. Large easily read dials simplify operation, and minimize congestion and delay in locker rooms.**

FOR ALL MAKES AND ALL TYPES OF STEEL LOCKERS

FOR NEW LOCKERS AND FOR REPLACEMENT OF WORN OUT LOCKS ON OLD EQUIPMENT

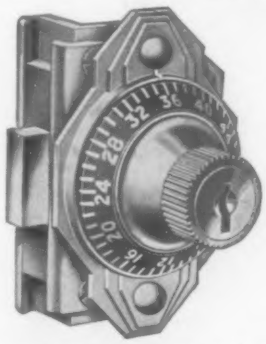
Exclusive Yale Features:

Maximum Security: Combinations dialed on three positive numbers. Combination must be known and cannot be located by manipulating dial.

Combination Disperser automatically upsets combination as lock is locked. A double safeguard. Acts as a defense against tampering.

Combination Changeable with every change of locker occupant—without removing lock from door. Feature secluded in back of lock in same secure manner as in Yale Bank Locks.

Supervisory Control of a group of lockers or the collective groups of a city school system obtained by the **Yale Emergency Key Control.** The key used is assigned exclusively to these locks.



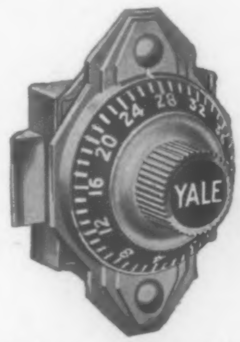
For Lockers with Automatic Bolt Release Mechanism. Automatic Self-Locking Vertical Sliding Bolt. A New Locking Principle.

Emergency Key Controlled

No. L3374-CM, Cadmium finish
No. L3374-DZ, Chromium finish

Dial Operated Only

No. L3364-CM, Cadmium finish
No. L3364-DZ, Chromium finish



For Steel Compartment and Box Type Lockers. Beveled Spring-bolt, Automatic Self-Locking.

Dial Operated Only

No. L3369-CM, Cadmium finish
No. L3369-DZ, Chromium finish

Emergency Key Controlled

No. L3379-CM, Cadmium finish
No. L3379-DZ, Chromium finish

For Lockers with Gravity Type Locking Device. Dead Bolt Manually Operated.

Dial Operated Only

No. L3368-CM, Cadmium finish
No. L3368-DZ, Chromium finish

Emergency Key Controlled

No. L3378-CM, Cadmium finish
No. L3378-DZ, Chromium finish

NEW YALE COMBINATION PADLOCKS

FOR BASKET LOCKERS AND ALL OTHER TYPES AND MAKES OF STEEL LOCKERS

The finest and most secure combination padlocks yet produced

No. 589
Master-Key Controlled Dial

Same features of maximum security and automatic combination disperser as the above built-in type.

No. 579 Lock, Dial operation only.

No. 589 Lock, Dial operation with emergency key, provides supervisory control of lockers. May also be used with any of above built-in types under same control key.

These padlocks have ¼″ diameter steel shackles and the graduations and numerals on the black enameled dial are easily read.

No. 515 Lock, Dial operation only. A good secure medium priced padlock. The steel shackle is 9/32″ in diameter and the case of solid rustless metal is attractively finished in bright baked aluminum.

The Yale Rotating Dial provides fast accurate dialing.

The Combinations are unlimited on all above padlocks.

No. 515
Dial Operated Only

and Integrated Studies"

COMPLETE . . . THOROUGH . . . EASILY ADAPTABLE

All Teaching Material Included

Included, at no cost, in the course, "Ediphone Voice Writing and Integrated Studies," are such necessary school materials as:

Student's Text-Book . . . Teacher's Manual . . . Qualifying Tests . . . Full-length Practice Records . . . Letterhead Pads . . . Transcription Error Charts . . . Personality Rating Chart . . . Certificate of Proficiency.

AUTHORITATIVE—Not the work of an individual, but written by education authorities (Kilduff, Goodfellow, Allen, Card and Copeland) this course is at once practical, functional, thorough. It is published by specialists in business education —South-Western Publishing Co.

THREE PHASES—Divided into three natural phases of instruction, "Ediphone Voice Writing and Integrated Studies" follows the step-by-step method of logic.

SPECIFIC—Each lesson has a specific objective—each has suitable typewriter drills. The course is completely indexed—well illustrated. The "why" of each direction is given. So clear that it is the *only* text that can be left with the student.

INTEGRATED—Throughout the course students are constantly reviewing other secretarial subjects — punctuation, syllabication, English, typing, etc.

TEACHER'S MANUAL—Provides a comprehensive Ediphone Voice Writing background. Tells the "what," "how" and "why" of classroom instruction.

Ask for a Proof Installation of The Ediphone—Investigate the complete course, "Ediphone Voice Writing and Integrated Studies." For full information simply write Dept. U41 Thomas A. Edison, Inc., West Orange, New Jersey, or Thomas A. Edison of Canada, Ltd., 610 Bay Street, Toronto.

EDIPHONES FOR SCHOOL ADMINISTRATIVE USE—Easy to use as a telephone, the new Ediphones will cut your letter-dictating time from 20% to 50%. Memos, notes, dates, instructions, ideas are recorded as you think of them—your mind freed for real administrative problems.

TEACH
EDIPHONE
VOICE WRITING

Ediphone
EDISON VOICEWRITER

DICTAPHONE CORPORATION

EDUCATIONAL DIVISION

420 Lexington Avenue, New York City, N. Y.

Dictaphone Business Practice Room at the Minneapolis Business College, one of the many progressive schools where this popular course is taught

Personnel Managers of Dictaphone's *free* Employment Agencies are highly successful specialists in placing Certificate of Proficiency holders—promptly and at better starting salaries

DICTAPHONE BUSINESS PRACTICE NEW IMPROVED TEACHING AIDS

A CONCISE 50-hour course, Dictaphone Business Practice (by Monk) is supplemented by an extensive teaching aids program to prepare students for secretarial positions in the **higher salaried brackets.**

This program embraces—

A series of 18 practice records
Individual Indication Slips
Letterhead Pads
Odell Minimum Essentials Test and Teacher's Keys
Tedens Minimum Fundamentals Test and Teacher's Keys
Transcription Error Charts
Speed and Accuracy Charts
Final Transcription Test
Certificate of Proficiency in Leather Folder
Student Employment Qualification Card
Personality Chart
Letter Writing Chart

Students who pass the final Transcription Test are awarded the coveted Dictaphone Certificate of Proficiency, a badge of ability recognized by executives using the Dictaphone system.

An Employment Qualification Card, outlining each graduate's capabilities, personality and grooming, provides a valuable liaison between the graduate and prospective employer. It further serves to aid the Personnel Managers of our coast-to-coast **free** Employment Offices in securing better-paying positions for Dictaphone certified graduates more promptly.

The placement records of many schools have shown marked upward trends after the adoption of the well-organized Dictaphone Business Practice Course.

A complete set of supplementary instruction material is available *without charge* to schools purchasing Dictaphone transcribing machines.

WRITE FOR COMPLETE PORTFOLIO OF FREE TEACHING AIDS

This coveted card tells the prospective employer that here is an above-average trained girl who is ready to *do* a job—not just take one

The well-trained Dictaphone secretary not only finds it easy to get a job—she can take her pick of positions that offer real opportunities for advancement

COMPREHENSIVE TYPEWRITING

Integrated with the Direct Dictation Method

This new textbook, "Comprehensive Typewriting" (Macmillan), by Miss Genevieve Hayes, Julia Richman High School, New York, and Miss Ivy Monk, Drexel Institute of Technology, Philadelphia, provides a comprehensive course of instruction for embracing both personal use and vocational typewriting. It is scientifically planned to combine visual and auditory training, effective with **all** types of students.

A special speed dial on Dictaphone transcribing machines enables the instructor to control speed and stroking automatically in rhythm practice. With this method students can be segregated into related ability groups which provides the equivalent of individual instruction and permits broader personal supervision.

Long experience has demonstrated that schools equipped with Dictaphones for teaching Direct Dictation Typewriting can train students to a high point of marketable competency in from one-half to one-third the usual time.

Write for full details on "Comprehensive Typewriting Integrated with the Direct Dictation Method."

FOR SIGHT CONSERVATION CLASSES

The Dictaphone Method enables the ear to supplement (and in some cases, to supplant) visual study. Modern Dictaphone equipment has become firmly entrenched in the Sight Conservation field.

Write for the interesting brochure "What Sight Conservation Teachers Say."

EQUIPMENT FOR SPEECH AND REMEDIAL READING CLASSES

Dictaphone recording and reproducing equipment has played a prominent role in the notable advances made in the Speech and Remedial Reading fields.

No other method can provide ten minutes of recording time for less than 1¢ per recording surface! This makes it possible for your students to have daily recording practice periods—invaluable in speech improvement and remedial reading classes.

The new Dictaphone Educational Telecord, now available in Portable and De Luxe Model Cabinets, has been especially designed for speech and remedial reading courses. Standard Dictaphone machines with multiple listening devices are also extensively used in this work.

The Dictaphone Educational Telecord includes a microphone and recording — reproducing playback unit. Faithful reproduction, low recording surface cost and simplicity of operation have made this machine invaluable to students and instructors alike

For those instructors who desire to supplement student recording and reproduction with eye and ear training, the textbook "Acceptable American Speech" by Raubicheck and Seals, plus a complete set of **permanent** practice records, is available without charge to purchasers of Dictaphone equipment for speech improvement classes.

NEW CAMEO DICTAPHONE

This lightest, most compact dictating machine on the market has met with an enthusiastic reception by America's business executives. Administrative Departments of the nation's most progressive-minded schools are fast following suit. The convenient portability of this beautifully designed machine has gained a widespread popularity with business executives and educational leaders. **Ask to have this modern machine sent to your school for a thorough trial . . . with no obligation on your part.**

Today's busy executive, weary of time-wasting, two-person dictation, now depends on his Dictaphone and his Dictaphone-trained secretary to keep work from piling up unnecessarily

UNDERWOOD ELLIOTT FISHER COMPANY

Typewriters...Accounting Machines...Adding Machines...Carbon Paper...Ribbons...and other Supplies

Complete Sales and Service in all principal cities

ONE PARK AVENUE NEW YORK, N. Y.

UNDERWOOD TYPEWRITERS

Made by the Typewriter Leader of the World

NEW UNDERWOOD MASTER TYPEWRITER . . . Modern, fast and dependable. Completely enclosed back, fully visible writing, quiet action, non-glare finish. Champion Keyboard . . . keyset tabulator and Dual Touch Tuning.

UNDERWOOD NOISELESS STANDARD TYPEWRITER . . . Pressure stroke action for noiseless operation with Champion Keyboard . . . non-glare finish. Available in various carriage widths.

UNDERWOOD TYPEWRITERS are available in 11″, 12″, 14″, 18″, 20″ and 26″ carriage widths—a request will bring you full information. THE UNDERWOOD STANDARD TYPEWRITER with AUTOMATIC JUSTIFYING DEVICE, which produces even right hand margins, is on display at all Underwood Elliott Fisher Branch Offices.

CHAMPION TYPEMASTER MODEL with inbuilt tabulator, completely enclosed back, touch tuning. Complete with carrying case.

UNDERWOOD PORTABLE TYPEWRITERS

UNIVERSAL TYPEMASTER MODEL is the popular general purpose portable. Typemaster features. Complete with carrying case.

NEW DE LUXE LEADER, ideal for students of all ages, has standard keyboard, back spacer. Complete with carrying case.

THE EXCLUSIVE UNDERWOOD PORTABLE TYPING STAND is built into the Portable Carrying Case. Supplied as extra equipment on TYPEMASTER models at slight additional cost.

NEW NOISELESS MODEL with all Underwood Portable features. Quiet, efficient and reliable. Complete with carrying case.

UNDERWOOD ELLIOTT FISHER COMPANY

Typewriters...Accounting Machines...Adding Machines...Carbon Paper...Ribbons...and other Supplies

Complete Sales and Service in all principal cities

ONE PARK AVENUE NEW YORK, N. Y.

UNDERWOOD SUNDSTRAND ADDING-FIGURING MACHINES

QUIET MODEL UNDERWOOD SUNDSTRAND . . . Here is a quiet portable electric adding figuring machine that is light enough to be carried easily . . . just the right size for desk operation . . . versatile to handle all business figuring . . . adds . . . subtracts . . . multiplies . . . divides . . . 10 numeral keys under the fingertips of the right hand make touch method of operation easy.

UNDERWOOD SUNDSTRAND FRONT FEED PORTABLE POSTING MACHINE . . . an all purpose Figuring Machine for addition, subtraction, multiplication, division and the preparation of Statements and Ledgers. Features include automatic cross tabulation, automatic month, automatic non-addition, automatic subtraction, automatic credit balances, automatic non-print. Also many optional features available.

UNDERWOOD ELLIOTT FISHER ACCOUNTING MACHINES . . . an individual model for every accounting need . . . are available at all UEF Branch Offices. For complete information address your inquiry to the Accounting Machine Division, Underwood Elliott Fisher Company, One Park Avenue, New York, N. Y.

UEF SUPERIOR SUPPLIES

1. Type Cleaner
2. Adding Machine Paper Rolls
3. Carbon Tally Rolls
4. Machine Oil
5. Ribbons
6. Brushes
7. Typewriter Pads
8. Carbon Paper
9. Carbon Paper Rolls
10. Cushion Keys

NATIONAL VULCANIZED FIBRE CO.

Wilmington, Delaware

You Save ON MAINTENANCE COSTS *with these Attractive* *VUL-COT* WASTE BASKETS!

THRIFTY Buyers Purchase VUL-COT baskets for Classrooms, Dormitories, Offices, Lavatories, Locker Rooms and Laboratories.

Because of their durability, savings are made on maintenance costs; VUL-COT baskets add attractiveness to any room. And there's a VUL-COT tastefully appropriate in color and shape for every room and use.

As you know, a waste basket takes more of a beating than any other piece of furniture in your school . . . yet here is one that is guaranteed for 5 years. You see, VUL-COT waste baskets are made of hard vulcanized fibre, which means that under ordinary conditions they will last and last attractively for years.

Unlike other types of baskets, VUL-COTS do not crack, dent, split, splinter, rust or corrode. Light in weight, they are easier to handle and to keep clean. They do not mar floors or furniture.

The first VUL-COT shown at right is the SQUARE TAPER, a smart style popular with executives, and ideal for reception rooms, libraries, or meeting rooms. Choice of Maroon-Brown, Olive-Green or Walnut.

	Square No. 4 Ins.	Square No. 5 Ins.	Square No. 6 Ins.
Top	10½x10½	12x12	14x14
Bottom .	8½x 8½	10x10	12x12
Depth ..	14	14	16

College and school letters in colors done for small extra cost depending on character and color. Simple identification marks . . . . no charge

Standard for 50 Years

The VUL-COT shown to right is the ROUND TAPER, the most popular shape for general use. These 3 practical sizes available in rich Maroon-Brown, Olive-Green or Walnut. Round baskets in No. 2 and No. 3 sizes are standard for office and schoolroom use. The Round Taper, just like all VUL-COT waste baskets, is guaranteed for five years.

	Round No. 1 Ins.	Round No. 2 Ins.	Round No. 3 Ins.
Top diameter	10	12	14
Bottom diameter	8	10	12
Depth	12	14	16

The tall basket in center at left is the ROUND STRAIGHT, a utility basket admirably suited for use in washrooms, basements, auditoriums, halls and locker rooms. Standard colors: Maroon-Brown, Olive-Green, or Walnut.

	Round Straight No. 9 Ins.	Round Straight No. 10 Ins.
Diameter	14	14
Depth	20	30

Just to left is the OVAL TAPER. This popular shape which comes in standard colors, is very practical for use where space is limited.

	Oval No. 11 Ins.	Oval No. 12 Ins.
Top dia.	8½x10½	13x10½
Bottom dia. ..	6½x 9	11x 8½
Depth	12	14

GUARANTEE

This Vul-Cot waste basket with ordinary usage should last a lifetime. It is absolutely guaranteed as to material and workmanship for a period of five years from date of purchase, when used only as a waste basket. If during that time in such service it proves defective, return and a new basket will be supplied.

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON, DELAWARE, U. S. A.

We make receptacles of all descriptions. Any desired type made to your order.

Write for special school discount price schedule to

NATIONAL VULCANIZED FIBRE CO.
Wilmington, Delaware

MILLER-BRYANT-PIERCE

DIVISION OF L C SMITH & CORONA TYPEWRITERS INC

ESTABLISHED 1896 — Aurora, Ill. — DIRECT BRANCH SERVICE

Manufacturers of

Typewriter and Other Inked Ribbons — Carbon Papers — Stencil Inks

Our Creed For 45 Years

THE BEST INKED RIBBONS CARBON PAPERS STENCIL INKS

FOR EVERY WRITING MACHINE REQUIREMENT

• TYPEWRITER AND OTHER INKED RIBBONS

Made regularly in all standard colors and color combinations, record or copying, and in seven different degrees of inking, for any machine requiring inked ribbons:

TYPEWRITING MACHINE RIBBONS
BILLING MACHINE "
ADDING MACHINE "
PHOTOLITHOGRAPHIC "

RIBBONS FOR HECTOGRAPH MACHINES
" " ADDRESSOGRAPH MACHINES
" " MULTIGRAPH MACHINES
" " TABULATING MACHINES

• CARBON PAPERS

Made in a complete variety of weights and finishes, in all standard colors and sizes, for any purpose where a carbon paper may be utilized:

ADDING MACHINE ROLLS—PLAIN OR CARBONIZED
CARBON ROLLS
COPYING CARBON PAPER
ELLIOTT ADDRESSING MACHINE STENCIL CARBON PAPER
NOISELESS CARBON PAPER
HECTOGRAPH COPYING CARBON PAPER
PEN CARBON PAPER
PENCIL CARBON PAPER
TRACING CARBON PAPER
TYPEWRITING CARBON PAPER

• STENCIL INKS FOR ROTARY DUPLICATING (MIMEOGRAPH) MACHINES

Open drum, closed drum, fountain feed, portable.

Prompt and careful attention given to special or unusual requirements by our Research and Development Departments

"The Miller Line is Superfine" MILLER LINE

SECTION IX
CAFETERIA—HOME ECONOMICS—DORMITORY

FACILITIES FOR TEACHING HOME ECONOMICS

By FLORENCE PALMER

Supervisor of Home Economics, Public Schools, Kansas City, Kans.

BELIEVING that the type of individuals and society found in a community is determined largely by the quality of home life enjoyed, Kansas City, Kans., has given definite recognition to education that improves home living. It is hoped that the instruction in these courses will help girls and boys to develop a greater appreciation and understanding of the ideals of desirable home life.

As the content of home economics courses has changed from the traditional cooking and sewing, so have the facilities for teaching these courses changed. No school system can furnish the latest developments in all equipment; however, laboratories that have become obsolete can be made over and modernized. An attempt has been made to do this in several Kansas City, Kans., schools with most satisfactory results.

This article, however, will consider the facilities for teaching home economics found in the two new high schools—Wyandotte, finished in 1937, and Sumner, a school for Negro girls and boys, finished in 1940. The enrolment in the homemaking classes at Wyandotte is approximately 900; at Sumner approximately 400.

Courses of Instruction

The number and types of classrooms have been determined by the enrolment and kinds of courses to be taught. Units in nutrition, food selection, food preparation and meal service are taught in a foods laboratory. Buying ready-made clothes, selection of fabrics, planning clothing expenditures, construction and care of clothes are taught in a clothing laboratory. Human relations, family living, family finance, furnishing the house, caring for the house, training the small child, and home care of the sick, are taught in a regular classroom with a home living room as a laboratory. The home living room was decided upon in preference to the apartment home living unit because it seemed to offer better opportunity for teaching large groups of students. Homelike situations are provided by the use of unit kitchens, a laundry unit, a roll-away bed unit, a dining unit, and a living room.

In each school the homemaking department is on the third floor in one section of the building. The home living room was placed directly across from the foods classroom in order that entertaining and meal service might be more conveniently cared for. Careful consideration in the planning of all classrooms was necessary so that all wall space possible should be available for built-in cabinets, blackboards, and bulletin boards.

The woodwork at Wyandotte is birch with dark stain; at Sumner it is dark oak. Wall finishes are natural plaster, an economy step. When walls need refinishing, a buff washable paint will be used. The floors in the foods and clothing classrooms are covered with heavy marbleized, plain bordered linoleum fitted before the moldings were placed.

Clothing Classrooms

The clothing classrooms are arranged so that there is sufficient general light. Drop lights provide ample artificial light and are hung low enough to be of use to the worker. All furniture in these rooms is matched as to finish. A system of individual, interchangeable drawers from sewing-case compartment into table compartment is used, thereby lessening confusion and providing safe storage for each student's materials. In two classrooms the four-pupil tables are in use; in one, the two-pupil tables. The two-pupil tables measure 5 feet by 20 inches; the four-pupil tables are 5 feet by 40 inches. All tables are 30 inches high, with 23 inches from floor to rail, to provide sufficient knee space. The tables are of birch construction and have three coats of highly acid-, alkali-, and solvent-resisting cabinet varnish.

The cutting tables are of birch construction with maple tops finished with clear white shellac. Two types are used, one with two drop leaves giving additional work space; the other measures 6 feet by 32

Individual, interchangeable drawers provide safe storage for students' materials in this clothing laboratory

inches by 3 feet and is made without the drop leaves. Each type is complete with drawers and cupboard space and each is equipped with a heavy-duty carrier for a roll of drafting paper. A toe cove is allowed on each side of the base.

Each clothing classroom provides space for 36 girls to work. There are nine sewing machines in a classroom, six electric and three treadle. Electric outlets are provided at suitable places. Sewing-machine cabinets are especially designed for school laboratories.

Across one side and one end of each clothing classroom are recessed cabinets that provide storage space in the form of bookshelves, drawers, a wardrobe, an exhibit case, and a compartment for table drawers. Two ironing boards in each classroom are a part of the built-in equipment. In one school each ironing-board cabinet provides a space at the bottom lined with asbestos and metal for the storage of the electric iron. At the other school each clothing classroom is furnished with a table with stainless steel top, and cupboard space below lined with asbestos and metal; this provides storage space for hot plate, teakettle, and electric irons and provides additional work space.

Adjoining each clothing classroom are a fitting room and a storage room. Lavatories furnishing hot and cold water and equipped with soap dispensers and

French doors make possible the combined use of the living room and a clothing classroom

Modern washing equipment is used in teaching the care of clothing and household linens

holders with paper towels are found in the fitting room. Here also is a triplicate mirror of French plate glass, the side mirrors pivoted to brackets permitting them to revolve completely. A full-length plate-glass mirror on the wall is a valuable asset to one clothing room. A fitting platform of birch construction covered with linoleum to match the floor is provided.

At Sumner the fitting room is in conjunction with a small laundry. The laundry equipment is composed of built-in double tubs, a galvanized portable tub, an electric washing machine equipped with safety wringer and a drain pump, a clothes drying rack, a cabinet for supplies, a work table, and built-in ironing boards.

Dress forms of different sizes, electric irons with textile regulators, a steam electric iron, scissors, pinking shears, a velvet presser, an electric hot plate, a teakettle, tailor's squares and yardsticks are furnished each clothing classroom.

The Living Rooms

Adjoining the clothing classroom at Sumner is the living room. French doors make it possible to throw the two rooms together for meetings of large groups. Off the living room is a large closet that stores a roll-away bed that is available for lessons in bed-making and home care of the sick.

A roll-away bed provides for activities related to the care of the girl's own room

Boys and girls learn the art of good social behavior in one of the home-living rooms

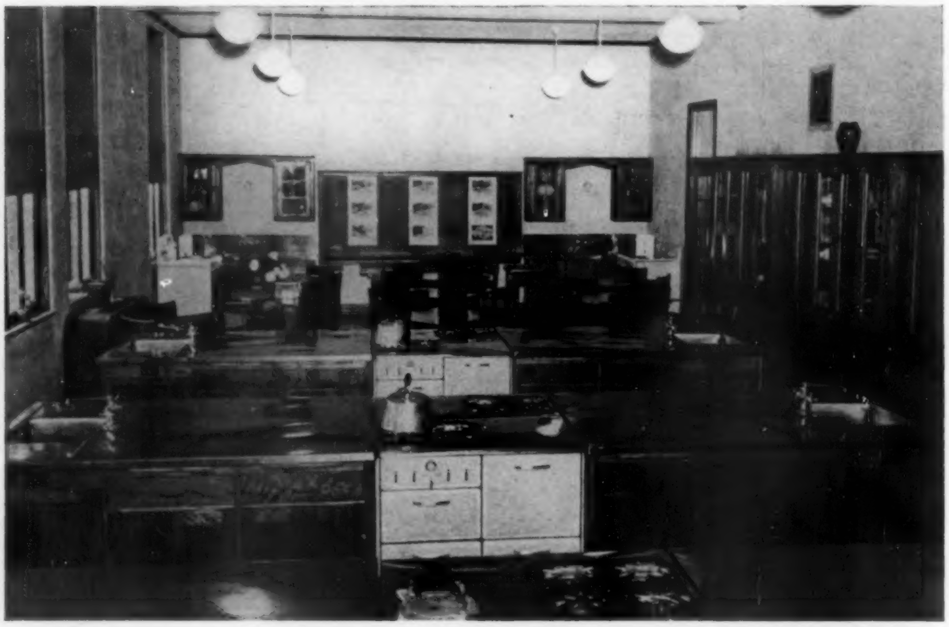
At Wyandotte the living room is large enough in itself to care for large groups. The furniture for these living rooms is maple of the Early American period. There are davenports, large comfortable chairs, ladderback chairs with and without arms, a secretary, coffee tables, end tables, drop-leaf extension tables, a decorative mirror, a textile hanging, pictures, lamps, vases, rugs and draw drapes furnishing each living room. Early American period furniture was chosen because it could be slip-covered or re-upholstered by the students. These rooms are cared for entirely by the classes in homemaking. Each living room is equipped with an electric sweeper with cleaning attachments for various purposes.

The living rooms, while furnishing a place for social gatherings of the department, are used as dining centers. They also furnish a laboratory for teaching the selection, arrangement, and care of house furnishings.

The Foods Classrooms and Laboratories

The foods classrooms furnish a combination of unit kitchens and groupings of equipment on the unit table plan. The unit kitchens are as near like a home kitchen as possible. Each kitchen provides built-in cabinets, work table with sink, a modern electric

This home-living room provides a desirable setting for the showing of afternoon and party dresses made in the clothing classes



The grouping of a cabinet, sink and stove into a unit provides cooking facilities for four girls. Unit kitchens are shown in the back of the room

stove, and a small table which can be used for serving foods and meals.

The unit table grouping consists of a fully equipped gas stove, family size, and a work table with sink. The work table provides work space, storage space for dishes and cooking utensils, and drawer space for linen, silver and cutlery. At Sumner the apartment house type of stove was chosen because it occupied less space. These stoves are all enamel, while those at Wyandotte are enamel with Monel metal work surface. The work tables are of birch construction; at Wyandotte they are covered with No. 22 gage stainless steel. The sinks are of the same material and are molded so as to form one continuous surface with the table tops. The sinks are at the ends of the tables and are enclosed with wood paneling. At Sumner the tops of the work tables are maple finished with several coats of clear shellac. Each table measures 5 feet 9 inches long including the sink, and is 4 feet wide and 34 inches high. The sinks are white vitreous enamel. Each sink is equipped with a removable cup drain, a grease interceptor and a swinging double service faucet.

Cabinets across one side of the foods classrooms provide a storage space for china, silver, linen, books, illustrative materials, brooms and cleaning supplies.

Students rotate in the use of the electrically equipped unit kitchens

Quartette tables in the foreground of this foods laboratory are used for serving by individual groups or for study tables

One unit of the cabinet is a towel-drying closet. This is lined with aluminum and provides approximately fifty towel racks. The racks are chrome-plated brass rods that project from the back of the closet. The closet is connected to the fan ventilating system, and the door has a panel that provides for the circulation of air. This drying device has proved most satisfactory. Another unit of the cabinet furnishes a separate shelf for each two girls for apron storage. Each stack of shelves has a door with a lock, making it impossible for girls of one class to use equipment belonging to members of another class. Each foods classroom has two lavatories equipped with soap dispensers and towel racks.

An electric refrigerator of approximately 7 cubic feet capacity helps to take care of the food storage problem for each laboratory.

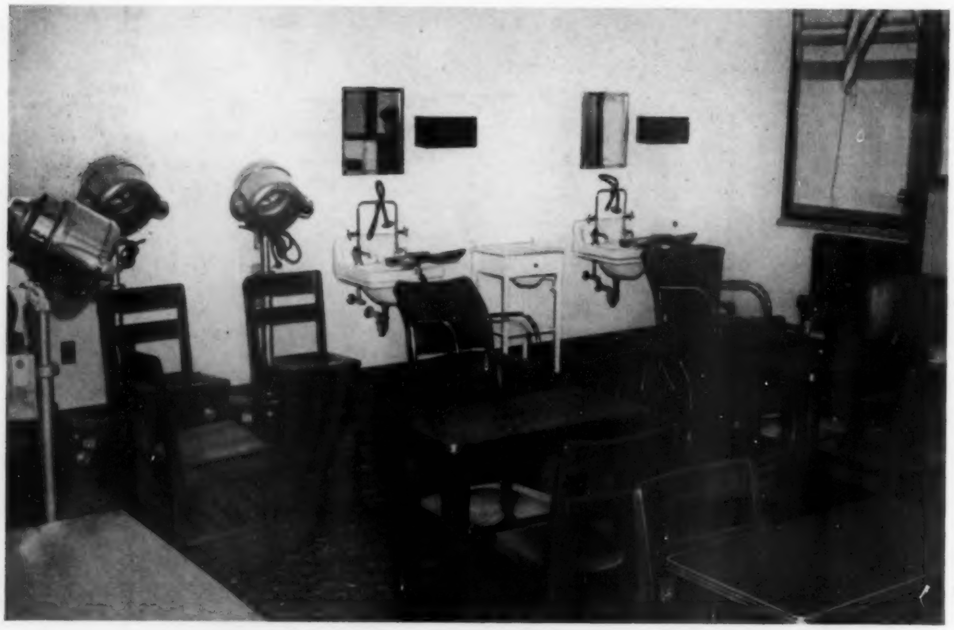
The supply tables match the unit tables and cabinets in construction and finish. Each one provides shelves, drawers, and a compartment equipped with a large flour container which rests on a floor that rolls in and out. This is secured to the interior of the cabinet and not to the door. All cabinets and work tables are built with toe cove at base.

To care for equipment occasionally used and for storage of supplies, a pantry is provided for each foods laboratory. The upper shelves are open, the lower ones are enclosed.

Each foods laboratory has eight tables to be used for study or serving. These tables are of the same construction and finish as the sewing tables. They are 3 feet square and are so finished that two or more tables can be placed together if more than four are to be served and if it does not seem desirable to serve in the living room.

For regular classroom use at Wyandotte each unit is provided with Syracuse china, Econo-rim in adobe; at Sumner with Syracuse china, Mohawk pattern. In order that the laundry problem may be as simple as possible, plate doilies are used. Two complete sets are provided, each set composed of 32 doilies. Each laboratory has an electric iron so that the students can launder small pieces. For meal service each laboratory is equipped with Syracuse dinnerware, appro-

A towel drying closet has proved very successful



Shampooing and drying facilities with manicure tables are important items of equipment in the cosmetology set-up

priate linen for different occasions, a complete service of flatware and a tea service. The silver is Tudor plate. In selecting cooking utensils different materials were chosen. Stainless steel was omitted because of the cost.

Each classroom chair provides a shelf under the seat for books not in use. Tablet arm chairs are provided for the regular classroom.

Personal Improvement Taught

At Sumner the laboratory for teaching cosmetology is available for teaching personal improvement. No technical instruction is given. Girls are taught personal cleanliness, care of the hair and hands, and the proper use of make-up.

Standards for Better Homes

The facilities found in these laboratories for the teaching of home economics are of the standard that is possible in the good homes of the community. They are better than those found in many homes, but better homes and home life are not possible without an ideal. It is hoped that the use of the right kind of equipment will help develop desirable standards and attitudes which will bring about better homes and a better community.

A built-in dressing table extends along one side of the cosmetology room

SOME ASPECTS OF PLANNING AND MANAGEMENT OF COOPERATIVE RESIDENCE-HALL FOOD SERVICE

By FERN W. GLEISER

Head, Department of Institution Management, Iowa State College

TO establish and maintain a high standard of food service is the aim of every dormitory food manager who is interested in the welfare of her charges. To reach this goal, however, may be more difficult in a cooperative food unit than in other types of dormitories, for several reasons.

Careful planning is essential to the successful management of cooperative residence-hall food service. Planning of every detail from the physical layout of the unit to the coordination of the work performed by the students in preparing and serving the food must receive attention.

Costs Low—Quality High

One of the first problems of the manager is that of finances. While many students who live in cooperative halls believe they are deriving benefits from the experience, the fact remains that the chief reason for establishing such organizations is to meet the need of students who must reduce living expenses while attending college. Therefore, the board fee is less than in other residence halls, and for this reason a lower food cost must generally be maintained. Ingenuity is required in meeting the low cost figure, for the desired menus should supply foods that will keep the budget in balance and at the same time not make the students unduly aware of the existence of bread pudding, beans, or hash. It is needless to say that the manager must exercise extreme care in buying and must practice economy to keep the quality of the food served at a high standard.

The Factors of Time and Experience

Another factor which must be considered in planning menus for a cooperative group is that lack of time and experience on the part of the student helpers imposes certain limitations upon the dishes that can be served. The time of preparation required is especially important, because the student's time in the kitchen is limited. Her cooperative work must be scheduled so that it will not interfere with classes. For example, since most of the students spend all or a large fraction of their morning school time either in class or in the library, as much of the lunch preparation as possible must be done before the students go to classes, leaving only last-minute preparations to be finished on their return. This eliminates the serving of foods which require preparation over a long period of time or which require constant attention, unless certain students can be scheduled to spend some free morning periods in the kitchen; quite a different picture from the residence hall which has one or two cooks, with an assistant or two, who are on duty all morning. Also, one must consider after-meal work. Too many casseroles, muffin tins or baking pans may detain the pan-washers in the kitchen so long that they are late for classes.

No less important than the time of preparation is the ease of preparation. The cooperative group is usually composed of students of varying experience in cooking and kitchen work. In a large cooperative group the new student is quite often frightened about cooking in large quantities and is ill at ease among the large kettles, mixers and other equipment. For this reason, dishes which are not too difficult to prepare or too complicated to serve are much more successful in a cooperative food unit. Carefully standardized recipes and directions written so clearly that there is little possibility for error, are essential. Even then, a close check must be made to insure that every student has followed her written instructions. Close supervision by a part- or full-time manager is advisable especially for the cooperative group.

One method of eliminating errors in food preparation is to assign one student to measure and weigh all ingredients as her share of the cooperative work. She is chosen because of her accuracy and dependability, so the possibility of error is less than when each student cook, regardless of her qualifications, measures her own ingredients. This method also saves time, since the one student becomes well acquainted with the storeroom and the location of supplies and can measure the ingredients much more rapidly than the other students.

The storeroom also requires more supervision in a cooperative hall than in other types of dormitories, since a cooperative group can rarely afford a full-time storeroom man. This situation requires watching to avoid food shortages, as well as care in planning deliveries, and supervision in placing the supplies on the shelves.

Kitchen Organization

An important aid to the successful functioning of a cooperative food service, of course, is a kitchen planned to meet the needs of that type of organiza-

tion. It necessarily must have a somewhat different arrangement from that of the usual dormitory food service, because of the difference in the number of workers in the kitchen at one time, as well as their manner of working. In a cooperative kitchen, there will be more workers in the kitchen at once, and there will be more activities going on at the same time, so allowance for this must be made in planning the

MENUS

MONDAY	Fruit cup Assorted cereals Toast—jam Coffee—cocoa	Royal scallop Tomato salad Bread—butter Prune whip—orange sauce Milk	Beef stew Parsley butter potatoes Pineapple—sweet relish salad Baking-powder biscuits Chocolate nut pudding Coffee
TUESDAY	Tokay grapes Assorted cereals Coffee bread Coffee—cocoa	Bacon and potato puff—cheese sauce Fruit salad Bread—butter Peanut butter cookies Milk	Meat loaf—chili sauce Scalloped potatoes Buttered whole green beans Bread—butter Gingersnap ice-box dessert Coffee
WEDNESDAY	Oranges Assorted cereals Toast—jam Coffee—cocoa	Macaroni and veal loaf—mushroom sauce Lettuce salad Bread—butter Assorted fresh fruits Milk	Roast pork—dressing Mashed potatoes Whole kernel corn with green pepper Jellied green gage plum salad Tea biscuits Butterscotch sundae Coffee
THURSDAY	Apple sauce Assorted cereals Coconut twists Coffee—cocoa	Scalloped tomatoes Meat sandwiches Peach salad—celery seed dressing Baked custard Milk	Chow mein—rice Mixed vegetable salad Crusty rolls Apricot upside-down cake Coffee
FRIDAY	Bananas Scrambled eggs Buttered toast Coffee—cocoa	Cream of potato soup Crackers Tuna fish salad Bread—butter Baked pears Milk	Stuffed baked potatoes with cheese Creamed cauliflower Buttered sliced beets Apple-celery-raisin salad Bread—butter Burnt almond sponge Coffee
SATURDAY	Tomato juice Assorted cereals Toast—jam Coffee—cocoa	Chili con carne Cabbage salad Bread—butter Apricots Milk	Swedish meat balls Creamed potatoes Baked acorn squash Sweet mixed pickle Bread—butter Pineapple fluff Coffee
SUNDAY	Fresh grapefruit Assorted cereals Cinnamon rolls Coffee—cocoa	Baked ham with ginger-ale sauce Mashed potatoes Buttered carrots Cranberry salad Parker house rolls Toffee ice cream Coffee	

Menus for a cooperative group must be limited to dishes that can be prepared in a minimum amount of time by student helpers who are not experienced cooks. As suggestive in this connection, a week's menus of the type used at Iowa State College are reproduced above

kitchen and installing the equipment to be used in it.

In the usual dormitory kitchen serving 100 students, there would be a cook, an assistant cook, a salad girl, and a pot- and pan-washer, each working in her unit. At meal time, there would be waitresses and dishwashers, in addition.

In a cooperative kitchen serving the same number, the set-up might be as follows: A committee of eighteen members is divided into groups, each unit performing dutes assigned for the preparation of breakfast and early preparation for lunch, as well as the setting of tables for the morning meal, followed by the serving of breakfast and washing dishes. These tasks must all be completed in the space of one hour and fifteen minutes, so that the students may change into campus clothes and reach their classes on time. Crowded into the lunch period of one hour might be the following activities: eighteen committee members finishing and serving lunch, then washing dishes from that meal; meanwhile another group appearing on the scene to brown the Swiss steak, prepare vegetables for dinner and mix a cake, all before the first afternoon class. It is obvious, therefore, that unless the kitchen is large enough to accommodate all this activity, and planned with that in mind, a great deal of confusion could result.

The cooperative residence hall kitchen must be planned so that these different groups may work without interfering with the work of others or being delayed by them. For instance, two ranges placed at opposite ends of the kitchen allow two different groups to be cooking at the same time without interfering with each other, and is therefore better than having one large range or two smaller ones placed side by side. Ample table space is also essential, and it, too, is better when not concentrated all in one place. For example, at one time two students may be dishing desserts, three others making salads, another arranging the butter, cream, and bread for the tables, so it lessens confusion if these units can be working in different parts of the kitchen.

There should be more than one sink, if possible. While one group of students are washing pans from lunch, another group may want to prepare vegetables for dinner, so the inclusion of at least two sinks is advisable.

The kitchen floor space in a residence hall may be 3 to 4 square feet per student, but in a cooperative hall in which three times the number of workers are in the kitchen at one time working in the manner previously suggested, the space per student must be greater. Efficiency demands that the cooperative hall kitchen be planned with this space factor in mind. It is obvious why the cooperative hall must provide 8 square feet of kitchen space per student in the hall.

While in all ideal residence-hall kitchens there is no crossing of workers' paths, this point is of especial importance in the cooperative hall kitchen, because of the speed with which work is done and the larger number of workers.

Kitchen Equipment

The selection of equipment for a cooperative hall kitchen should demand the greatest consideration. Unless the school furnishes and keeps in repair the initial equipment, replaces worn-out equipment and adds new equipment, the small amount of money available from the student board income for this purpose limits the amount of equipment that can be purchased.

As good a quality of equipment as can be afforded should be selected. Equipment will be subjected to hard usage, particularly because of the large number of inexperienced people who will use it.

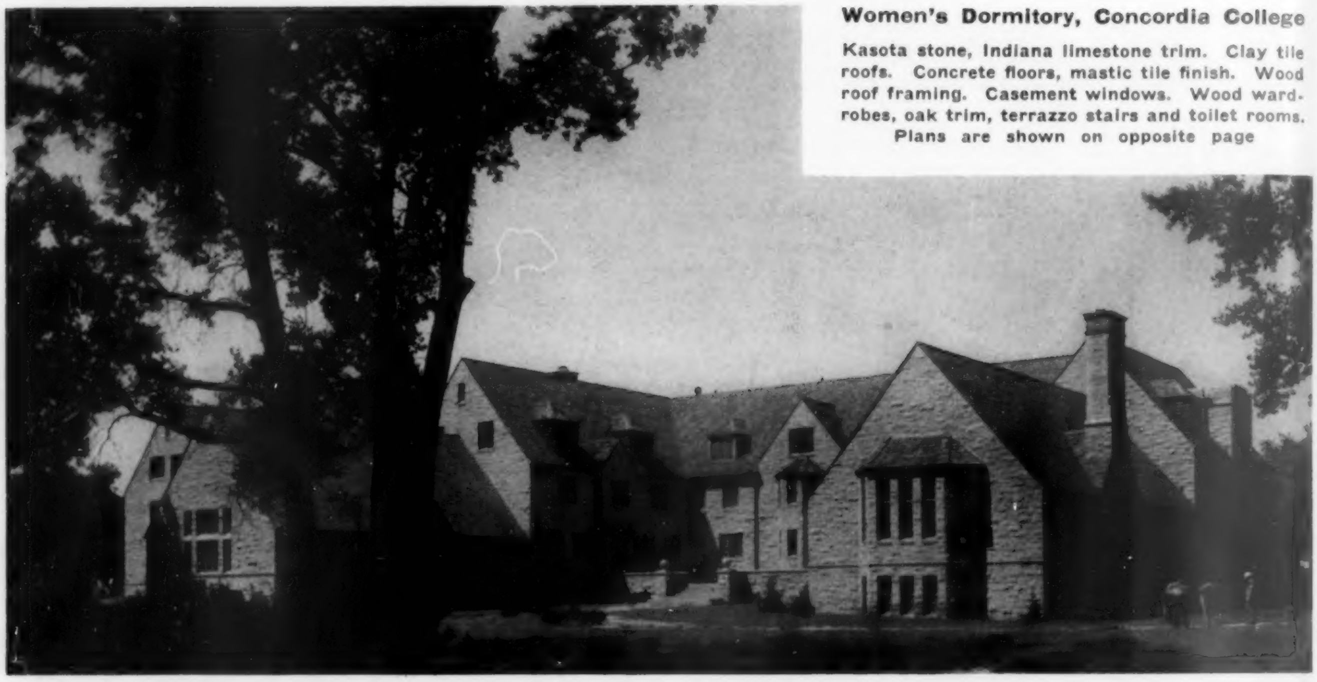
One may ask why one person could not be trained to use one piece of the equipment and keep that job during the whole year. It has been found, in many cooperative units, that the students are much better satisfied and consider it more fair if the jobs are passed around so that each has her turn at the more or less undesirable duties.

Time-saving equipment is important because of the speed which seems necessary in a cooperative kitchen, but care should be taken to avoid equipment which does not have every device for protection of the worker. Complicated equipment, if considered important, should have directions for its care and operation posted beside it.

There is a need for a larger number of the small pieces of equipment in a cooperative kitchen because of the number of workers. It takes more kettles, pans, spoons, knives, measuring cups and other utensils to equip this type of kitchen. These utensils should be of good quality, and fairly heavy because of the hard usage they receive.

Summary

The cooperative-hall food director must create interest and obtain cooperation from the students in their work. But the manager in a successful cooperative residence hall system must also consider the material factors of a carefully planned budget: well-balanced meals at low cost; foods which take little time and are not difficult to prepare; a method to insure accuracy in preparation of food; and well-planned floor space with adequate equipment for the work to be performed.



Women's Dormitory, Concordia College

Kasota stone, Indiana limestone trim. Clay tile roofs. Concrete floors, mastic tile finish. Wood roof framing. Casement windows. Wood wardrobes, oak trim, terrazzo stairs and toilet rooms. Plans are shown on opposite page

DORMITORY PLANNING—1941

By WILLIAM M. INGEMANN

Architect, St. Paul, Minn.

BACK in 1933 I prepared an article entitled "Planning Men's Dormitories for Today and Tomorrow" (see THE AMERICAN SCHOOL AND UNIVERSITY, 1933-34). It is interesting now, in the light of subsequent experience and observation, to see wherein the tendencies then noted have carried through, and what new ideas and departures from traditional dormitory planning have been introduced. The present article is therefore largely a continuation of the previous notes.

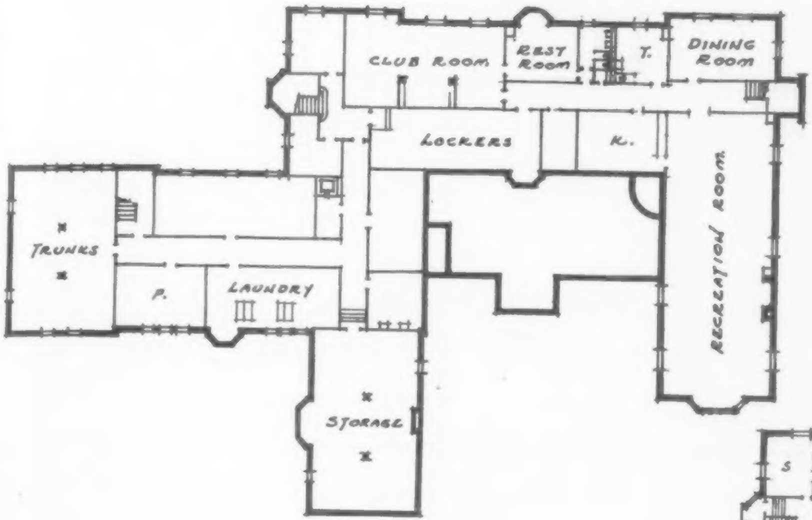
Perhaps the most striking characteristic of the newer dormitories has been the tendency no longer to consider the dormitory as a collection of sleeping rooms grouped within a building conforming more or less to the established architectural style of a particular campus. Instead, it is generally obvious that an attempt is being made in each case to determine the type of room accommodation best fitted for students of the particular college in question and to plan the room size, arrangement and furnishings with due regard to the study, sleep, comfort of the student. The next step is to arrange these rooms in the best relationship with respect to orientation and to social, recreational, eating, sanitary and service facilities. If these steps are properly taken, the third and last step, that of designing a pleasing and satisfactory building, will pretty much take care of itself, although the finished result may bear but little resemblance to other parts of the campus. This is as it should be; changes in planning ideas and new materials and construction methods must have freedom of expression in the outward appearance of our buildings.

Dormitory Directors State Their Needs

Not long ago we sent out questionnaires to a number of colleges with comparatively recent dormitory building experience. An attempt was made to get a cross-section of opinion on the type of accommodation best suited for girls' dormitories at a particular institution. The response was most gratifying and a tabulation of the replies received is published for the first time with this article.

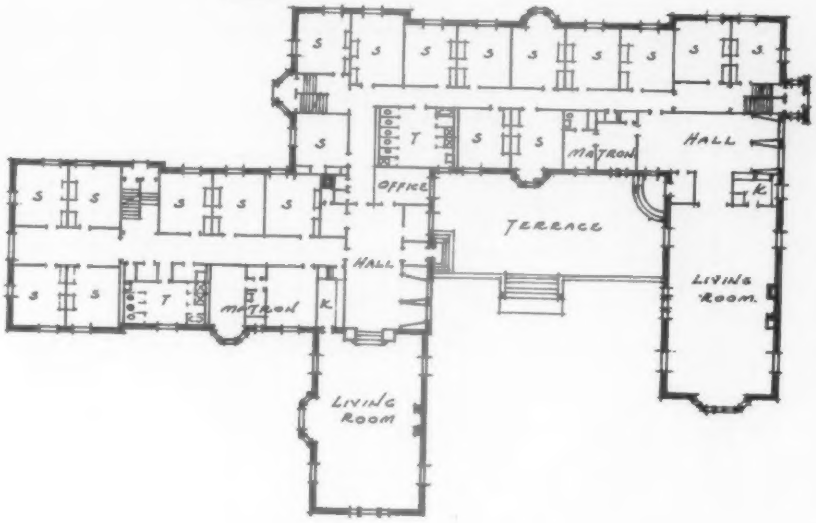
Summarizing the results of this questionnaire, it is clear that most dormitory directors still prefer to divide their residence into groups of not over sixty with single study bedrooms opening on corridors rather than around individual stair halls. This latter arrangement is more popular and more economical for men's dormitories. The Augsburg College Dormitory, illustrated herewith, is an example of this type of planning.

Group lounge rooms are preferred over large commons, and alcoves and a library should be provided. Recreational spaces such as a ground floor playroom and outside terraces are desirable. Dining rooms



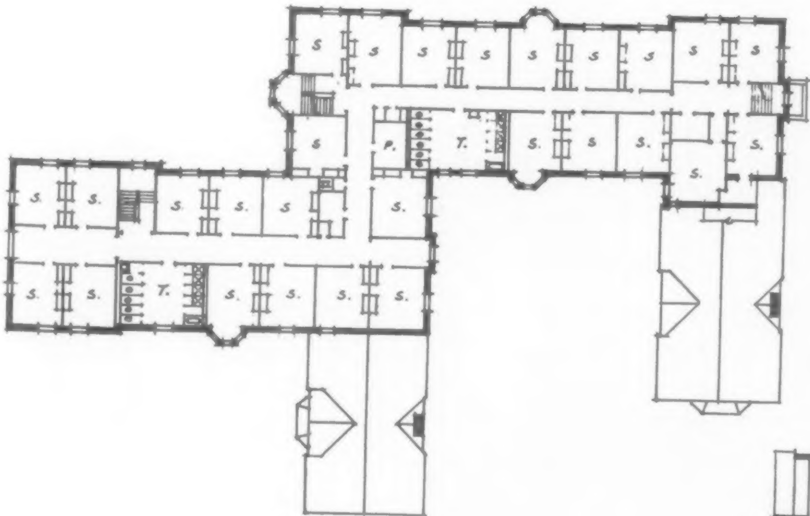
Basement Plan (left)

First-Floor Plan (below)



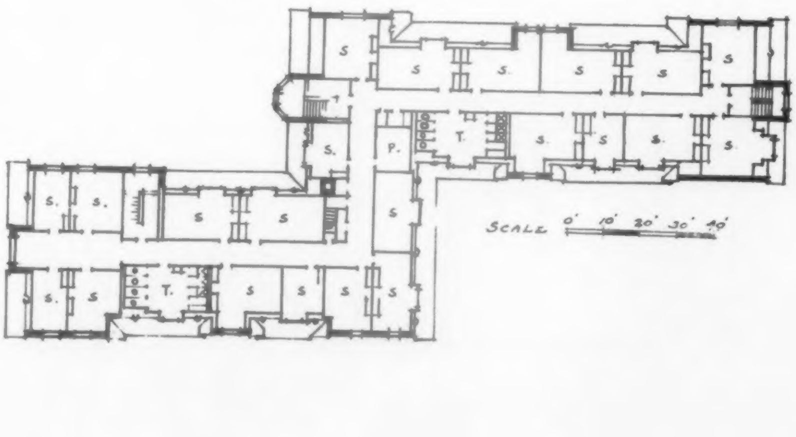
Legend:

S—Study Bedroom
K—Kitchen
T—Toilet
P—Pressing Room



Second-Floor Plan (left)

Third-Floor Plan (below)



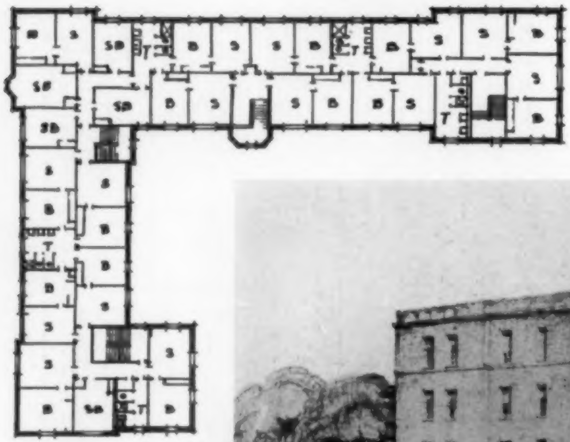
This building accommodates 134 girls, two lounge rooms, recreation room, off-campus girls' room, laundry, etc. Cubage, 487,336 cubic feet. Cost, $170,000 without equipment

Summary of Returns from a Questionnaire Sent to Dormitory Directors

In the hope of obtaining a cross-section of opinion on the type of accommodation best suited for girls' dormitories, questionnaires were sent out to a number of colleges with comparatively recent dormitory building experience. The persons in charge of residence-hall management were asked to reply not only to questions concerning the type of facilities in their new buildings, but to state their preferences as between various possible alternative arrangements

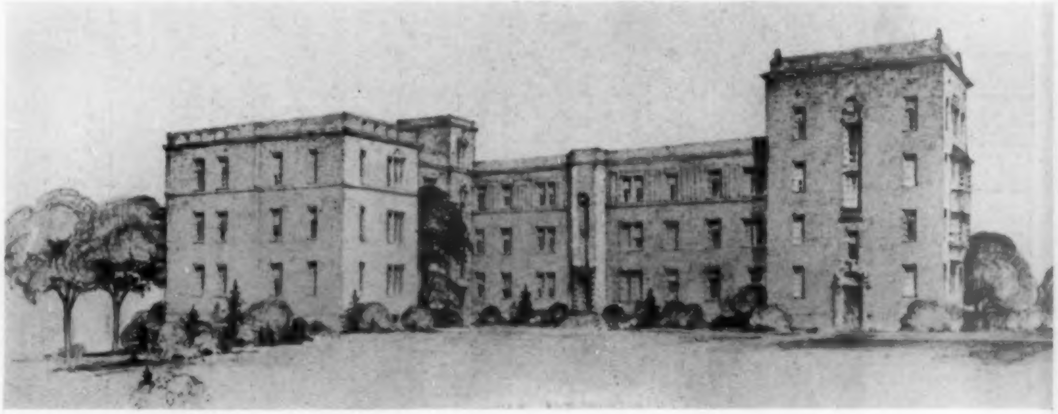
QUESTIONNAIRE		Pomona College	Chicago, University of	Georgia, University of	Florida, University of	Colorado, University of	Stanford University	Rochester, University of	Brown University	Barnard College	Oklahoma, University of	Oregon, University of	Pennsylvania, University of	Washington, University of	Lawrence College	Wisconsin, University of	Wells College	Cornell University	St. Catherine, College of	Carleton College	Michigan, University of	Michigan State College	Radcliffe College	Indiana University	Scripps College	Lake Forest College	Smith College	Purdue University	TOTALS (Note—27 colleges included in study)
Part I—GENERAL																													
Women Attending		400	2327	1000	1850	1316	1150	500	460+	1100+	2566	1202	1386	5000	360	3187	292	1299	350	383	3329	1465	1000	1700	213	146	2000	1000	
Number Housed in Dormitories		300+	362	500	1107	290	700	170	184	345	200	240	180	300	275	285	288	706	300		775	680	364	350	212	75	1900	120	
What per cent do you favor housing?		80	50	50	100		100	60		50		33			100		100			100	100			100	100	100	100	100	
Size of Dormitories																						246							
			41		150	60	75	110	60						140	130				125	20	262	18	100	50	55			
		80	66		to	to	to	20	35	107	30	112	135	75	105					115	to	60	to		to	20	60	120	
			72		300	75	12	10	24	238	85	16	25		35	155				96	450	83	79		60				
			81						10						10					25		12							
Type of Room	Single	x	x			x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	24
	Double	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x		x		x	23
	Suite	x					x	x			x	x	x			x				x	x		x			x			11
Group Living Rooms		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	26
Group Dining Rooms		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x			x	x	x		x	x		x	x	22
Toilet Facilities	Hall	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	26
	Suite	x			x			x		x			x		x				x	x									8
Do you recommend dormitories divided into	Groups of 40		x								x	x	less		x				x										5
	Groups of 60	x	x		x	x	x	x	x					x		x				x		x	x	x	x		x		15
	More			75+				x						x				x				x	x			x		x	8
Do you recommend buildings of	2 Stories	x					x				x	x			x		x								x	x			8
	3 Stories		x		x				x				x	x	x	x		x	x			x		x				x	12,
	4 Stories		x			x		x	x												x	x	x			x			8
	More									x																			1
Do you recommend the plan of	Rooms on Corridors	x	x	x	x	x	x	x	x	x		x		x	x		x	x	x	x	x	x	x		x		x	x	22
	Suites around Stairways										x		x			x								x		x			5
Part II—LIVING ROOMS																													
Do you advocate	Group Living Rooms	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x			23
	Commons Room	x	x	x	x	x	x		x	x					x		x	x		x		x		x	x	x	x	x	18
	Private Alcoves		x		x	x	x		x			x	x	x	x			x	x	x				x	x			x	15
	Library	x	x	x	x	x	x	x			x	x	x		x	x		x		x	x	x	x	x	x		x	x	21
	Music Rooms		x	x		x				x		x	x		x	x					x	x	x	x				x	13
	Card Room		x		x	x	x		x			x			x	x					x		x	x		x	x	x	14
	Play Room	x	x		x	x	x	x	x	x		x	x	x	x	x		x		x	x	x	x	x			x	x	22
	Upper-Floor Lounge	x				x	x		x	x	x			x		x			x	x	x	x	x	x		x		x	16
	Porches or Terraces	x	x	x	x	x	x	x	x	x		x	x			x	x	x	x	x	x	x	x	x	x		x	x	23
	Living-Room Kitchenettes	x			x	x	x			x		x	x	x		x				x	x			x	x				13
Part III—DINING ROOMS																													
Do you advocate Dormitory Dining Rooms		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	26
Which do you prefer	Large Dining Room		x					x		x			x		x		x				x					x	x		9
	Several Small Dining Rooms	x		x	x	x	x		x	x	x	x		x		x		x	x	x		x	x	x	x				18
What per cent of girls would use dining room?		95	100	100		100	100	100	100	100	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Which do you prefer	Table Service	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	26
	Cafeteria Service	x		x		x				x			x			x					x	x						x	9
Is interior access to dining room essential?		x	x	x		x	x	x	x	x	x	x	x	x			x	x		x	x	x	x	x	x		x	x	22

QUESTIONNAIRE		Pomona College	Chicago, University of	Georgia, University of	Florida, University of	Colorado, University of	Stanford University	Rochester, University of	Brown University	Barnard College	Oklahoma, University of	Oregon, University of	Pennsylvania, University of	Washington, University of	Lawrence College	Wisconsin, University of	Wells College	Cornell University	St. Catherine, College of	Carleton College	Michigan, University of	Michigan State College	Radcliffe College	Indiana University	Scripps College	Lake Forest College	Smith College	Purdue University	TOTALS (Note—27 colleges included in study)
Part IV—BEDROOMS																													
Which do you prefer (if a combination, indicate percentage)	Single Study-Bedroom	70%	95%		10%		75%+	x	x	x	25%		15%	x	10%	70%	x	x	10%	x	x		x	x	x	x	x	x	23
	Double Study-Bedroom	10%		x	x	x					75%						x		10%	x	x	x						x	11
	Study & Bedroom for Two	20%	5%		x		25%									10%		x	50%	x									8
	Study & 2 Bedrooms for Two				x							x	85%		90%	20%			20%	x						x			8
	Study & 3 Bedrooms for Three																		10%										1
	Two Studies & Bedroom for Two																												
Which do you prefer	Wardrobes																												
	Closets	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	27
Do you favor Built-in-Furniture			x		x			x				x			x	x		x	x	x	x	x				x			12
Which do you prefer	Painted Woodwork	x	x					x	x						x		x			x					x	x			9
	Varnished Woodwork			x	x		x			x	x	x	x	x		x	x	x	x	x	x	x		x			x	x	18
Which do you prefer	Painted Walls			x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x	23
	Papered Walls		x																								x		2
Which do you prefer	Wood Floors			x	x		x					x	x	x			x	x		x		x	x				x		12
	Composition Floors		x	x	x	x		x	x		x				x	x			x		x	x		x		x		x	15
Do you favor kitchenettes for	Each Group				x	x	x						x		x	x				x	x	x		x	x				11
	Each Floor	x				x		x	x	x		x		x					x	x			x			x	x	x	13
Do you favor Pressing Rooms		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	27
Part V—TOILET FACILITIES																													
Which do you prefer	Bathroom Connecting 2 Double Rooms												x		x					x						x			4
	Suite Bathrooms	x		x	x						x	x					x		x										7
	Off-Corridor Toilets		x		x	x	x	x	x	x				x		x	x	x	x	x	x	x	x	x	x		x	x	20
How many girls to each toilet room?		5	12		8	13	5-6	6	4	35 rms.	8	8—16		8		8	12		7	25	24—30	8	11	8	5		5	5	
Do you favor	Lavatories in Bedroom		x				x	x		x	x	x		x		x		x	x					x	x				12
	Shampoo Facilities				x	x	x	x	x			x		x	x						x	x		x				x	12
What percent do you favor	Showers	80	50	x	90	66	75			50	50	66	90	x	80	100	50	x		x	75	95	x	25	80	50	50	80	
	Bath Tubs	20	50		10	33	25			50	50	33	10	x	20		50				25	5	x	75	20	50	50	20	
Do you recommend a Laundry		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x	x	x	x	x		x	x	24
What per cent of girls would use a laundry?		75	75	100	35	100	high		many	many		95	100	50—75	90					90	75-80		many	80	80		15—20	100	
Part VI—CONTROL and ADMINISTRATION																													
Matron's suite	For Each Group				x	x	x							x	x				x		x	x		x	x			x	11
	For Entire Dormitory	x	x	x			x	x	x	x	x	x	x				x	x		x	x		x			x	x		17
	Office Connected	x	x	x					x	x		x							x	x					x	x		x	11
	Kitchenette Connected	x		x		x	x					x					x		x						x			x	9
Do you advise a Main Office for Dormitory		x	x	x	x	x	x	x		x	x	x	x	x				x	x	x	x	x		x	x	x		x	21
Do you advise	Entrance Control	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	24
	Guest Suite	x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	25
	Basement Use	x	x	x	x	x	x	x	x		x	x	x	x		x		x	x	x	x	x	x	x		x	x	x	23
	Maid and Janitor Facilities	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	26
What call service do you advise	Telephone Each Floor		x		x		x	x		x		x		x					x	x		x	x				x		12
	Telephone Each Group	x				x					x					x	x			x	x								7
	Telephone Each Room			x					x				x		x										x			x	6
	Buzzer System		x	x		x	x	x	x		x			x							x	x	x	x					12



Legend for Second-Floor Plan

SB—Study Bedroom B—Bedroom
S—Study Room T—Toilet



Dormitory for Men, Augsburg College

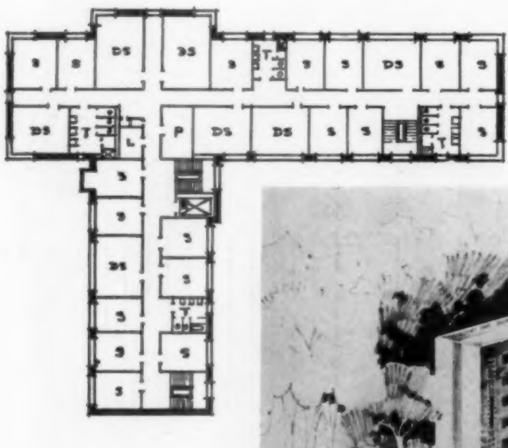
Brick and tile, concrete floors and stairs, mastic tile finish. Metal wardrobes. Rooms arranged in suites of two rooms for two men. All study-rooms directly accessible from stair halls, and all bedrooms open directly into communicating bathrooms. Building accommodates 104 men, including complete dining facilities for 250 students. Cost, $125,000 without furnishings

should be no larger than necessary to accommodate the residence of each unit, and must of course be accessible without going outside.

Closets seem to be preferred over wardrobes, although I believe this is because students have not had opportunity to try out a well-arranged wardrobe. Window-seats and bookshelves and well-designed, built-in furniture are desirable but expensive. Varnished woodwork and painted walls and floors of wood or composition are most popular. Kitchenettes, pressing rooms, and laundry facilities should be available to all. About 70 per cent of students prefer showers to tubs, and the proportion should be one shower to approximately eight girls.

Examples of Dormitory Design

The dormitories illustrated herewith were built between 1937 and 1940 at costs ranging from $1,200 to



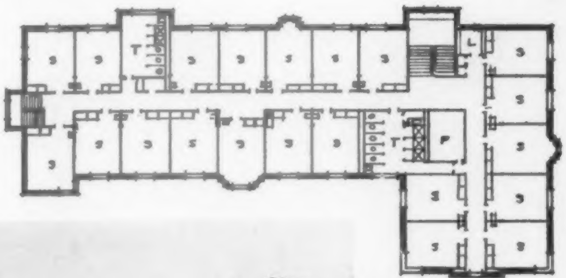
Women's Dormitory Building, University of Minnesota

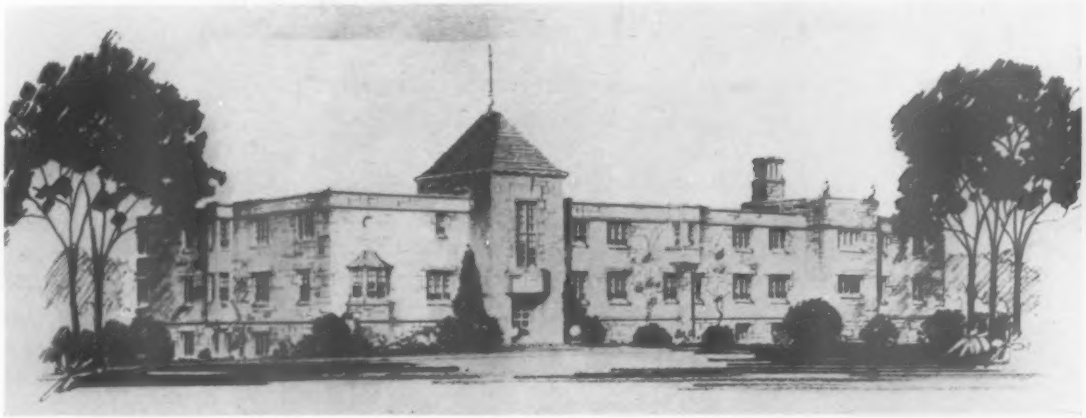
Complete data are not available. Sketch and second-floor plan represent preliminary studies only

DS—Double Study Bedroom P—Pressing Room
S—Study Bedroom E—Elevator
L—Linen Storage Room T—Toilet

Legend for Second-Floor Plan

P—Pressing Room	S—Study Bedroom
L—Linen Room	T—Toilet





Women's Dormitory Building, Gustavus Adolphus College

Wall of tile and Kasota stone with Indiana limestone trim. Slate roof, concrete floors, mastic tile finish, casement windows, and metal wardrobes. Building accommodates 86 girls in double rooms with one lounge room, library, recreation room, private dining room and kitchen. Cost $101,000 including furnishings

$1,500 per student housed. We believe these costs compare favorably with any obtained elsewhere in the country, and on this basis it is possible to give college students modern and pleasant residential facilities without necessitating too high rental charges or a too heavy drain on the college's financial resources.

THE FUNDAMENTALS OF SCHOOL LUNCH SERVICE

By F. O. WASHAM

Director of Lunch Rooms, Board of Education, Chicago, Ill.

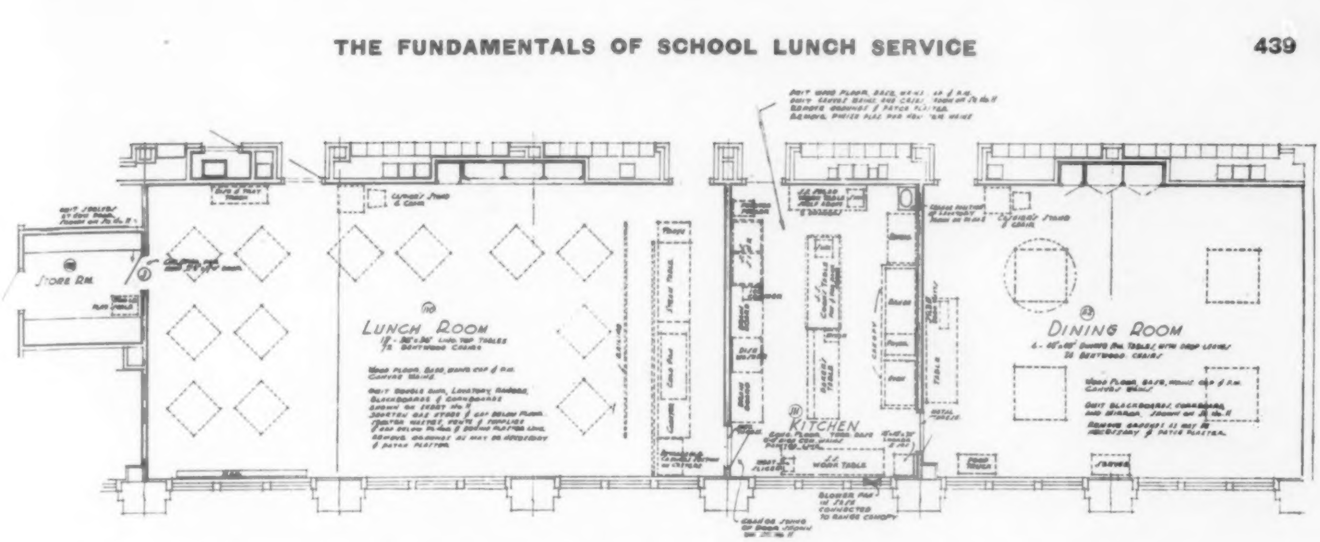
SATISFACTORY school lunch-room service will differ in almost all school systems, but only in detail. Certain fundamentals are essentially the same in every locality. In this article, therefore, an effort will be made to deal with these fundamental considerations.

Superior Personnel

Personnel must be selected and retained for ability to do a good job exclusive of all other considerations. The price at which food must be sold to students is so low, and the quality demanded so high, that no great amount of gross profit exists, and certainly not enough to carry on the payroll the lunch room manager's "Aunt Minnie, poor old soul who needs the job so badly," or the ward committeeman's fifth cousin who secured two votes for him at the last election.

A college education has just as great advantages for the lunch room manager as in any line of commercial endeavor, though in my opinion not an absolute essential. I number among my acquaintances several very excellent school lunch room managers who have never gone to any college except the one of Hard Knocks, which issues no diploma. At the same time, I have observed a number of young girls who have had their Home Economics training with a foods

The kitchen at Farragut High School was laid out and equipped for efficient service



Lunch room, kitchen and dining room of this vocational school were planned for efficient service

or institutional management major, progress in this field of endeavor much faster than they might have without it.

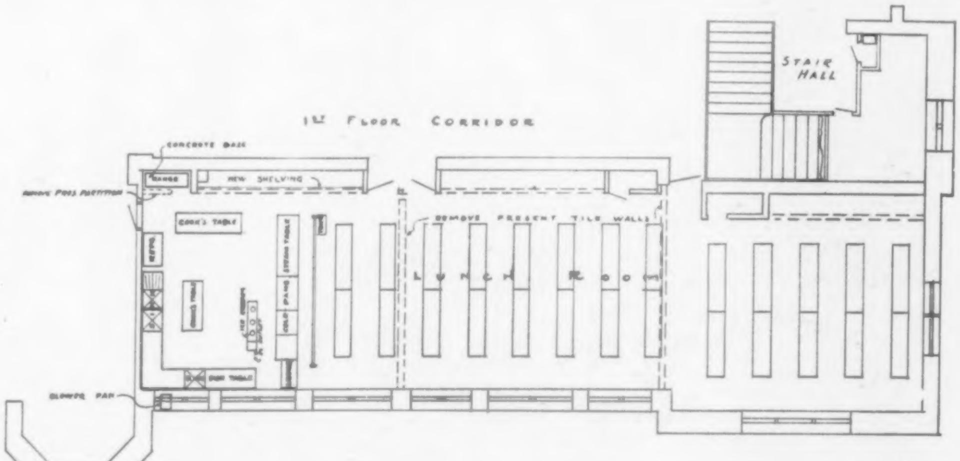
Good Equipment

It requires a highly skilled workman to do a good job with poor equipment, and he could do a better job with good equipment. From a dollars-and-cents standpoint, it is the poorest kind of economy to begin or to continue the operation of a school lunch room without adequate equipment. School buildings are erected to last many years. The lunch room equipment should be planned accordingly. Such items as counters, work tables, sinks, etc., should be made of stainless metal heavy enough to prevent denting and bruising. We advocate 14 gage stainless metal for counter tops, table tops, and sinks, while we do not consider it good economy to employ the use of this metal in mechanical equipment which will become obsolete before it is worn out.

The size of a kitchen, the amount of equipment to be purchased, the capacity of the dining room, etc., depend in a great measure on the policy to be followed by the school. If, as is the case in Chicago, the students are permitted to leave the premises at will during the noon hour, that condition must be taken into consideration and provision made, in planning the equipment, to handle certain items of food or beverage that it will be found necessary to include in the menu in order to induce students to lunch in the school lunch room rather than patronize privately operated stores in the neighborhood. If, on the other hand, students are required to remain on the premises throughout their noon hour, somewhat different planning may be advisable.

One large item of cost is dining-room space provided in the original building contract. This can be kept at a minimum by planning the school program to have several lunch periods or relays at the noon hour. In general, it will not inconvenience the educational program to have four lunch periods in a high school. This will permit the lunch room to cater to

The lunch room layout in the Sabin branch of Tulay High School was designed to meet the needs of 700 pupils and to facilitate the work of a staff of 6 full time and 4 part time



a greater number of students, with less equipment and less dining-room space.

In most school systems, dining rooms are used a portion of the school day for study halls. With this in mind, they should be well lighted and treated with acoustical material. The dishwashing rooms and kitchens should be separated from the dining room by partitions which would eliminate or reduce the chances of the noise of kitchen employees doing their preparation or clean-up work from disturbing the students at study in the dining room.

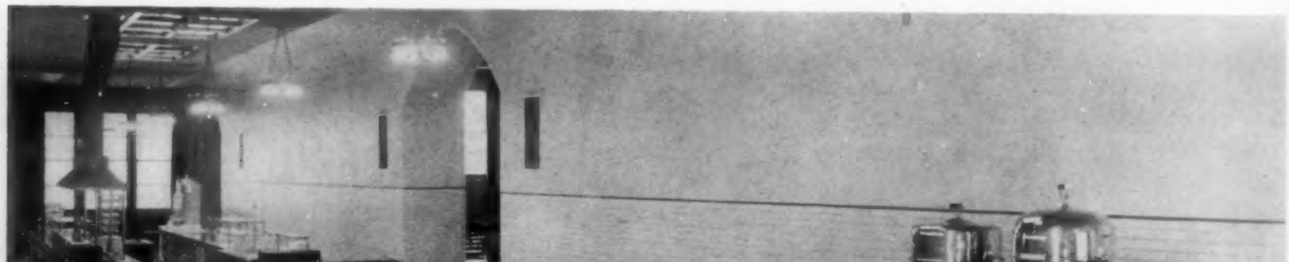
A lunch room serving as many as 500 can profitably operate a bake shop for production of pastries, hot breads, desserts, etc., and equipment should be provided accordingly. Lunch rooms serving as many as 1,000 students per day can profitably make their own ice cream, frosted malted milk, and other frozen desserts. Provision should be made for a counter freezer and the necessary storage and hardening cabinets for this purpose. Ample refrigeration facilities should be provided in all cases. Our experience indicates the following formula to be about correct:

Expected Patronage	*Refrigeration Storage Space*
200	20 cu. ft.
500	60 " "
1,000	400 " "
3,000	600 " "

The reason for increased refrigerated capacity per student served when going from 200 up to 1,000 is that, in general, the number of items offered on the menu is larger as the volume of business increases, and, in addition, the bake shop, pantry, etc., will make heavier demands as more of the preparation will be done on one day and the foods carried over night for final cooking or baking the following day.

Stainless steel should be used exclusively for all food service and storage utensils, while heavy-duty aluminum is, in our opinion, the most satisfactory cooking utensil. Pressure steam cookers and steam-jacketed kettles are indispensable in the average high school or college kitchen, and of course such labor-saving devices as food choppers, slicing machines and power-driven mixing machines must be included.

Dish-washing and glass-washing machines must be



The serving room at Lane Technical High School was planned to expedite the task of serving 6,000 pupils daily

equipped with a dual water supply. In general, it is not practical to provide hot water throughout the building, in the kitchen sinks, etc., at a temperature higher than 140 to 150 degrees F., while the temperature of the rinse water on the glass-washing and dishwashing machines should be a minimum of 180 degrees F. This requires the use of booster heaters. There are a number of good makes operated by gas, steam, and electricity.

Gas cooking equipment is widely used because of its generally lower first cost and its subsequent lower operating cost. However, where cheap electric rates prevail, electrically heated cooking equipment is very desirable. In almost all communities, certain electrically heated equipment will be found most practical. In this class are such items as toasters, sandwich grills, glass coffee makers, etc.

Good Raw Material

Having selected good personnel and provided good equipment, the next essential is to purchase good raw materials from which to produce a good finished product. It is essential that the purchasing agent for a school lunch room system be thoroughly familiar with foods and food markets. He or she must know how to write a specification which will insure that all prospective bidders are quoting on substantially the same grade and type of merchandise. After contracts are awarded, it is essential that constant check-ups be made to see that the material is delivered in accordance with the specifications.

The planning of menus requires an infinite amount of skill and ingenuity, since they must be planned with the thought of serving the student with the most nourishing, body-building food that can be provided for the price he can afford to pay. Then, it requires still more skill to prepare these foods and display them on the cafeteria counter in such an attractive manner that the student can be induced to purchase and eat them. All practically minded school lunch room managers know that it is not so much what is in the menu that counts as what is in the child when the lunch period is over. It is not enough that the food offered be good for the child; it must taste good

In the dining room of the Austin High School, Chicago, students enjoy good food in pleasant surroundings

At Roosevelt High School a machine for making frosted malted milk has proved itself a good investment

to him. It must be so attractive that his appetite is stimulated, and it must be priced within his means. Good equipment and good housekeeping are material aids in displaying foods attractively, but this problem every day challenges the utmost in human artistry and salesmanship.

The Cash Register

Good cash registers should form the basis of the accounting system. In our opinion, a good cash register is one which indicates the sale in plain, bold figures, easily read from a considerable distance, which issues a receipt to the customer and has a sealed total which cannot be reset except by a designated auditor, and preferably not at all. The duties of food checking and cashiering (checking the food tray, and ringing up the sale, and accepting the cash for it) should never be handled by one and the same person. No item of food should be allowed to leave the counter without the sale's being rung up on the cash register. Employees' meals should be registered the same as that of any customer, although the employee may be permitted to sign the check, and the balance after this amount is deducted from the register reading will determine the amount which should be in the cash drawer. The register readings as reported daily should be verified by an auditor at least once each month. The money should be deposited in a place designated by the school officials, and all transactions should be handled by check. In general, all other accounting procedures should merge with those of the school system.

DOEHLER METAL FURNITURE CO., INC.

For Dormitory—Cafeteria—Reception Room—Infirmary

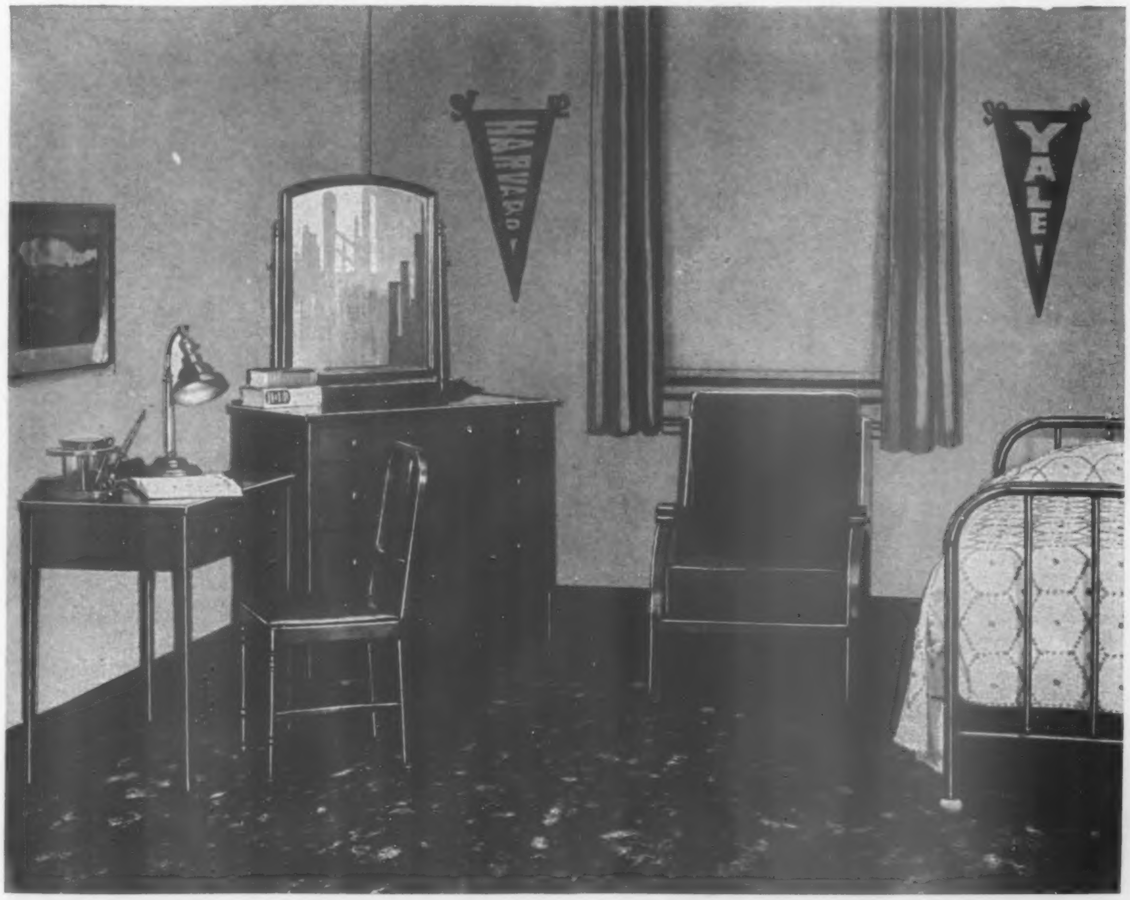
Executive and Sales Offices: 192 Lexington Avenue, New York

METAL FURNITURE

For Dormitories, Bedrooms and Infirmaries

CHROMIUM FURNITURE

For Auditoriums, Cafeterias and Offices



DOEHLER dormitory furniture and equipment is now being widely used throughout the country in many of the outstanding schools and universities. Our many years of experience in meeting the exacting demands for attractive, durable metal furniture is responsible for our enviable reputation in the dormitory equipment field.

The interior pictured above, illustrates only a small portion of our very extensive line of stock items particularly adaptable to school and dormitory use. Our line covers a complete range of varied designs in suites and separate pieces of both the traditional period design and the currently popular contemporary styles.

Doehler furniture is truly comfortable. All metallic sounds have been eliminated, drawers always slide easily, it never loosens, cracks or chips. All products are available in both natural wood grain reproductions and in pleasing, cheerful colors of Dohlite which is resistant to cigarette burns, hard knocks, steam heat, climatic conditions, and which always retains its original attractiveness.

WRITE FOR ILLUSTRATED CATALOGS AND COMPLETE DETAILS

FOR BEAUTY *PLUS* DURABILITY—

No. 421-1 Dresser

We illustrate one of our most popular Dormitory Suites, "THE PRESIDENT."

A number of other Suites, in modern and period designs, are available in groupings, or in individual pieces.

All items are available in both natural wood grain reproductions and in cheerful solid or duo-tone colors, finished to resist heat, acids and adverse climatic conditions, thus assuring a permanent attractive appearance.

No. 421-2 Chiffonier

No. 421-7 Desk

No. 421-8 Night Table

WITHOUT OBLIGATION WE WILL PREPARE BUDGETARY ESTIMATES FROM YOUR FLOOR PLANS

SELECT DOEHLER METAL FURNITURE

No. L.V.G. 171 Double Deck Bed

No. L.V.G. 170 Single Bed

No. 505 Student's Library Desk

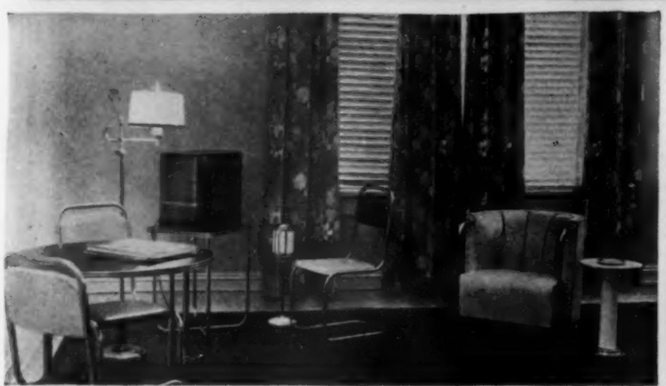
Doehler Furniture is "BUILT LIKE A BATTLESHIP" to withstand endless years of hard usage. Its popularity is due to durable construction, distinctive designing and remarkably low pricing suitable to all budgets.

No. 260 Side Chair

No. 277 Arm Chair

INQUIRE ABOUT OUR COMPLETE LINE OF SPRINGS, STUDIO COUCHES, COTS AND MATTRESSES

Illustrating the suitability of Doehler Hospital Furniture to the modern college infirmary of today. The simple but smart styling lends an air of cheerfulness and friendliness which is ever desirable.



CREATING the RIGHT IMPRESSION with DOEHLER CHROME and STAINLESS STEEL

Doehler Tubular Furniture is now available in sparkling Chromium or Stainless Steel—Distinctive and rich in appearance, yet remarkably modest in cost. The colorful, cheerful upholstery materials are durable and easy to clean — the table tops, built of formica, will withstand heat and acid.

We particularly recommend the installation of this equipment in Cafeterias, Reception Rooms, Offices, Lobbies and wherever Furniture is required to withstand many years of hard usage.

WRITE FOR COMPLETE DETAILS AND ILLUSTRATED LITERATURE

INLAND BED COMPANY

Manufacturers

3921 S. Michigan Avenue, Chicago, Ill.

PRODUCTS

Inland Beds, Mattresses, Pillows, Cots and Metal Furniture for College Dormitories and Infirmaries.

PROVED BY USE

Leading educational institutions, through long years of experience with Inland products, have found that they can be depended upon for long satisfying service under hard use.

ADVANTAGES

Inland furniture is specially designed for dormitory and sleeping room use. It is constructed of rugged steel and offers features which no other materials can match. It is sanitary, easily cleaned, fireproof, extremely long on service. Inland furniture comes to you in a variety of pleasing colors and a wide range of beautiful wood finishes.

INLAND BEDS

Rigidity and sturdiness, with lasting freedom from noise and rattle, are assured in all Inland Beds by the use of double wedge corner locks. All Inland springs, which are available in a choice of three spring constructions (Banded Link Fabric Spring, Double Deck Coil Spring, and Double Deck Coil Spring with Platform Top) are made from the finest quality Premier wire and are finished in a special quality rust-resistant baked enamel.

METAL FURNITURE

Inland Metal Furniture is not only unusually attractive and sturdy, but it offers maximum resistance to marring, burning by cigarettes, and the effects of alcohols and chemicals. There is no veneer to peel. The drawers, which cannot warp, slide with ease on special guides, regardless of humidity or other weather conditions.

Inland Metal Furniture offers you a full measure of good appearance and dependable service. Its cost will be found exceptionally low for merchandise embodying the highest standards of material and workmanship.

BOOKLET

The following are described and illustrated in a Special Dormitory Supplement, a copy of which will gladly be mailed upon request:

Beds—nine styles—four types of springs, including box springs
Double Deck Beds—three styles
Folding Cots—three styles
Mattresses, Pillows, Cot Pads
Dressers, Chests, Study Desks, Chairs
Hospital Beds, Bedside Tables and Screens for the Infirmary

JAMES L. ANGLE COMPANY

DIVISION OF CARROM INDUSTRIES, INC.

Ludington, Michigan

Manufacturers of Institutional Furniture for College Dormitories, Lounge and Reception Rooms, Cafeterias and Dining Rooms

No. 4007 Side Chair
Seat 17" x 17". H. 34"

THE personnel responsible for the manufacture of James L. Angle furniture possesses a combined experience of well over 100 years. Specializing in institutional furniture, this experience has resulted in the construction of a type of furniture for college dormitories, cafeterias and dining rooms that meets all the requirements of hard wear and mass usage. Good appearance, enduring construction and low upkeep are prime factors in the consideration of any institutional installation and these qualities are paramount features of Angle Furniture.

All posts, spindles, rails and other solid parts are constructed of select northern hard Birch. All tops, fronts, ends and panels are of northern Birch plywood, with northern Birch cores and cross banding laid with water resisting glue. This combination of woods results in a construction that will give the utmost in service for years.

No. 4157
Arm Chair
Seat 20" x 19".
H. 35"

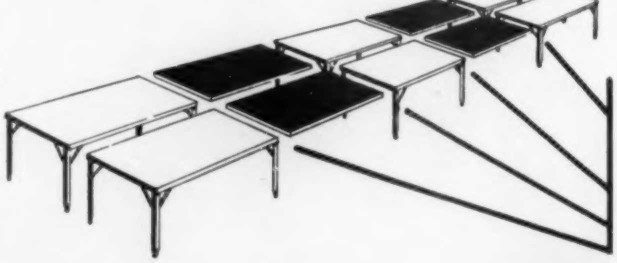
No. 4056 Dining Commode, with inner drawer
Top 14" x 30". H. 33"

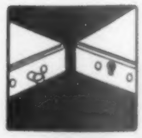
No. 4060 Dining Table
Top 36" x 36".
H. 30"
Also made to size

No. 4071
Arm Chair
Seat 20" x 19".
H. 35"

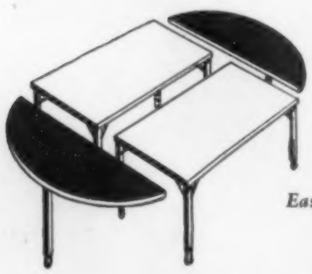
CARROM BANQUET TABLE HOOK-UP COMBINATIONS

Banquet Tables and Tops are Interchangeable, with Many Combinations to Fit Every Need



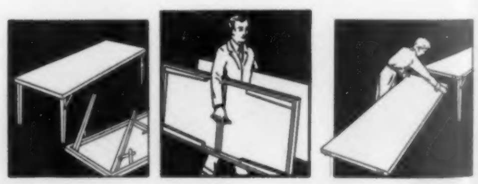


The interlocking feature on these tables makes possible assemblies of any desired length or width—the size being restricted only by the dimensions of the room. It makes a firm, tight and thoroughly safe—as well as easily made—construction.



No Loose Parts—All in One Piece—Round Ends When Occasion Makes Them Desirable

Easily Carried. One Man Replaces Crew



Write for Circular and Price List

Swedish Modern Dormitory Group Emphasizes Design and Construction

In the furnishing of college dormitory rooms, furniture of good design, properly finished, is desirable. But here again construction to meet hard wear and assure low upkeep is of vital importance to the budget-minded. Many of the construction features embodied in James L. Angle Furniture are exclusive.

Wood seat chair top and bottom posts are wedged and pinned into seat to prevent loose joints. (See Figure A-2.) All seat joints are firmly glued and splined the entire length of the joint. (Figure A-3.) All stretchers pinned to post or to each other. (Figure A-1.) Bendings are of one piece—no joints. (Figure A-4.) . . . Tops of dressers, bedside tables and desks are removable, and may be replaced with new tops for less than cost of composition tops. Standard supporting mirrors are detachable from the base without marring the tops. . . .

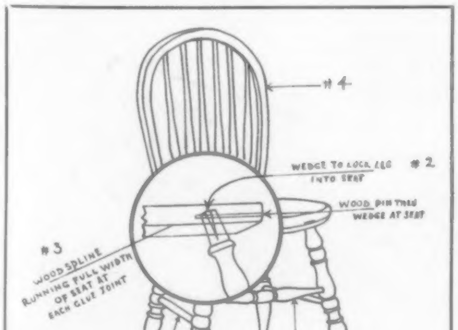
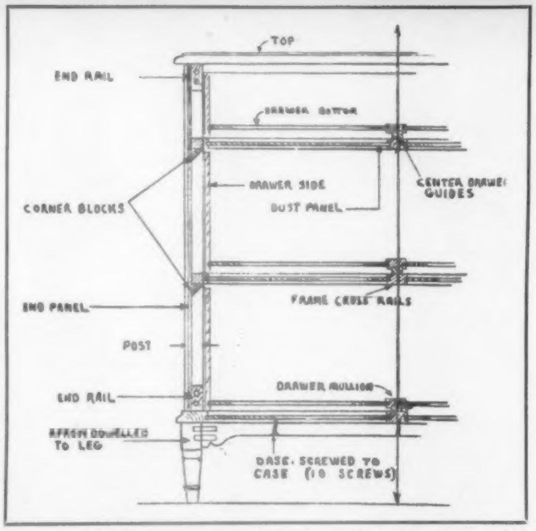


Figure A



Corner blocks support all rails inside of case. All drawers have built-in center drawer guides, assuring smooth easy operation. No sticking

Seat cushions of easy chairs are enclosed pocket Marshall Type in which the springs are fastened to each other, to the bottom grid and border wire with metal rings. This construction will outlast several of the ordinary string-tied units. Slip covers are provided on easy chairs and can be removed for cleaning purposes. . . . All pieces are finished with a special, exclusive material that is water, moisture and alcohol proof. Interiors of all cases are sprayed with water-proofing material, sealing the wood against moisture and vermin.

. . . SEND FOR COMPLETE DETAILS . . .

SIMMONS COMPANY

DORMITORY DIVISION

Merchandise Mart Chicago, Illinois

SIMMONS STEEL FURNITURE, especially designed and constructed for dormitory use, meets the color and design preferences of youthful occupants. Youth likes modern furniture—Simmons Steel Furniture, without being extreme, is modern in every sense of the word.

Steel construction renders modern Simmons Furniture practically indestructible—an important factor when one considers the use to which dormitory furniture is subjected. Fire hazards, so far as furniture is concerned, are eliminated by the use of this fire-resistant furniture.

Simmons Steel Furniture provides an easy means of keeping within budget limits. Maintenance costs are reduced to a minimum. The smooth, lustrous surfaces are easily maintained. Drawers do not warp or stick in heat or cold. The exclusive SIMFAST finish is easy to clean—retains its handsome appearance for years—is resistant to chipping and marring.

In considering present or future replacements, additions or initial furnishings, the Simmons Dormitory Service man can be of help to you. He is familiar with dormitory furnishing problems — and will be glad to suggest room layouts to meet *your* individual decorative and budget requirements. There is no obligation.

SEND FOR THIS CATALOG TODAY! Every school official should have a copy of this new, colorful, 38-page catalog for ready reference. Illustrated in color, it contains complete information on Simmons Sleep Equipment and Steel Furniture. It provides an easy and economical way to select individual pieces of furniture for complete rooms, to meet with any decorative scheme and at prices to fit your budget. We'll be glad to send you your copy without any obligation.

SIMMONS DORMITORY FURNITURE AND SLEEP EQUIPMENT

Modern Simmons room arrangements for dormitories are cheerful and practical in appearance. The rooms below are typical of the pleasant and comfortable living conditions assured by Simmons Steel Furniture

Simmons attractive color schemes make possible many refreshing decorative effects. A cooling, restful atmosphere can be obtained, or one that is warm and enlivening. Beautiful wood grain effects are also available

The fire-resistant features of Simmons Steel Furniture have made it the choice in many dormitories. With other materials, fire hazards are always present, but with this modern Steel Furniture, they are eliminated

500 Simmons beds, springs, mattresses and chests are being used in the girls' new dormitory rooms in the University of Wisconsin. The modern lines of Simmons Steel Furniture registers a definite appeal to both men and women students of all ages

Simmons Steel Furniture makes it easy to provide attractive, homelike living quarters at low cost. It is in line with any school budget—and maintenance costs are negligible

B-950 Double Deck Bunk—The attractive appearance and wide price range of this Simmons item makes it a favorite for dormitory rooms. Of Colonial design, it has the strength to stand abuse. Equipped with Slumber King spring—has long bearing corner lock. May be taken apart and used as twin beds, as shown in circle

Simmons Bed H-343 and Bedside Table F-351 are practical suggestions for the school infirmary. The Hospital Bed has adjustable posture bottom. Both pieces are made of steel, finished in Simfast. Easy to keep clean. Simple, attractive, matching styles

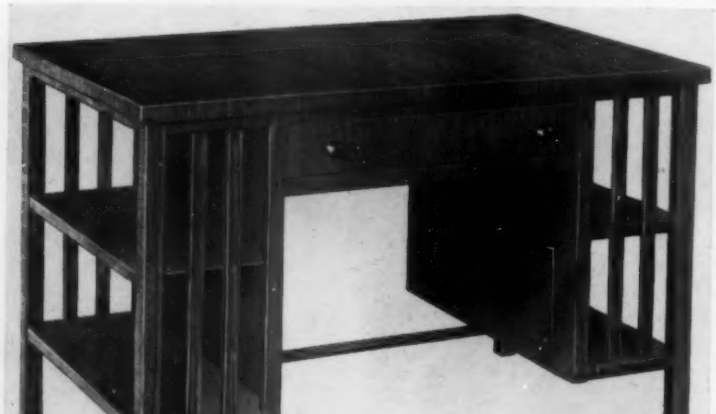
SUPERIOR SLEEPRITE CORPORATION

Main Offices and Factories: 2219–2323 South Halsted Street, Chicago, Illinois . . .

Write For Information On:—

- ***Superior Metal Dormitory Furniture***
- ***Springs and Mattresses***
- ***Beds and Double-Deck Bunks***
- ***Metal Desks and Tables***
- ***Metal Chairs and Easy Chairs***
- ***Chromium Tubular Furniture***
- ***Cafeteria Tables and Chairs***
- ***Infirmary Beds and Equipment***

Send outline of your problem in as much detail as possible, and let our service department submit SUPERIOR solution designed to meet your particular requirements. Address request to Superior Sleeprite Corporation, 2219-2323 South Halsted St., Chicago. . . .
Attention, Contract Department



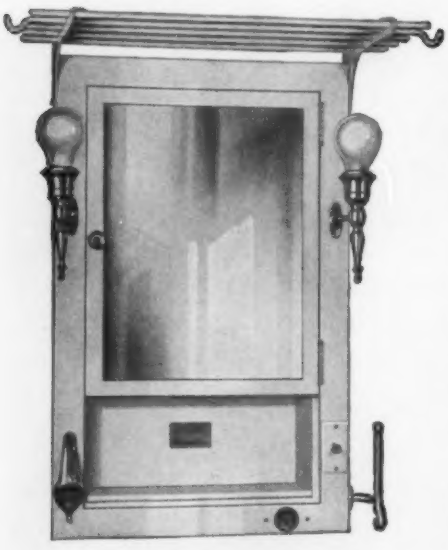
Specialists in fine enamel finishes . . . to resist hard use. Will not crack, chip, or flake. May be easily, neatly, and economically retouched with ordinary facilities . . . anywhere.

MIAMI CABINET DIVISION
The Philip Carey Company
MIDDLETOWN, OHIO

MIAMI
Bathroom
CABINETS
Mirrors and Accessories

MIAMI Bathroom Cabinets were developed by Miami-Carey designers in cooperation with leading architects. Design and equipment are based on long experience and thorough knowledge of dormitory requirements. Thousands of these cabinets are installed in the world's leading dormitories, hotels, clubs, and public buildings. The cabinets illustrated are practical. This is a proven fact. However, if you are designing a new dormitory or remodeling an old one, the Miami-Carey organization will co-operate with you in working out your own ideas.

The list of Miami Cabinet installations include: Notre Dame, Columbia, Yale, Texas, Duke, John Carroll and many other colleges and universities. Write for catalog and complete details—address Dept. AS.



Dormitory Special

DORMITORY SPECIAL

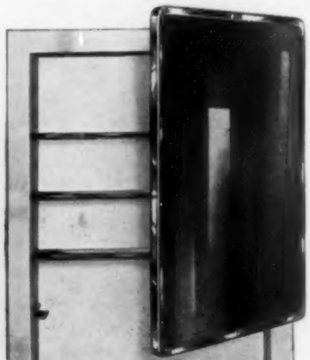
Regular Equipment: Overhead towel tray with douche bag hooks; two bronze, chromium-plated light brackets; light switch, convenience plug for electrical accessories, combination face towel and razor strop hook, used razor blade drop, three adjustable glass shelves and one white Vitrolite shelf. Cabinets are completely wired at the factory.

MASTER MODEL NO. 1100 WITH NEW TUBULAR LIGHTS

Chrome framed; no knob, hardware or portion of the body is visible. Frames are one-piece solid brass, chrome applied over nickel. Cabinet body and door back finish is Miami **Crystal Snow.** Heavy chromium-plated, piano-type hinges; copper-backed mirror; four-plate glass shelves; drop for used razor blades; toothbrush racks.

Metal parts of light brackets are brass, finished in deep, lustrous chromium. Glass shade is opal, designed to take a T-8 clear bulb, either 40 or 60 watt. Bulb is available at all stores that sell light bulbs. Cabinet is wired complete at the factory. The light fixtures, switch (in bottom of left-hand fixture), and electric convenience plug are included in the complete assembly. Eliminates the cost of three electrical outlets per bathroom.

No. 1100 with Tubular Lights



Model No. 1616

MODEL 1616

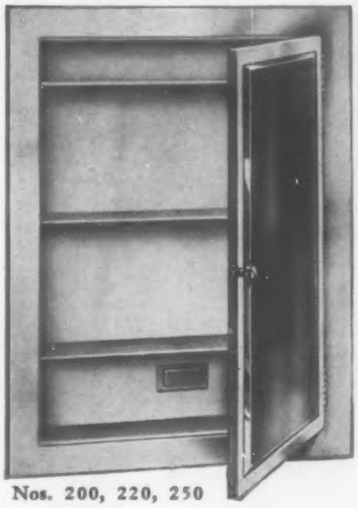
Ideal for a Man's Bathroom

Has an abundance of storage space behind the door. The open shelf below the door furnishes ample shelf space for shaving and toilet articles. The mirror is set in a stainless steel frame, polished and buffed to a chrome-like finish. Equipped with three bulb edge glass shelves, two toothbrush racks, used razor blade drop.

Flush Door Recessed Model Cabinets . . .

are especially recommended for the modest bathroom where price is the important consideration. They are practical in design, rugged in construction, and of a uniformly high quality.

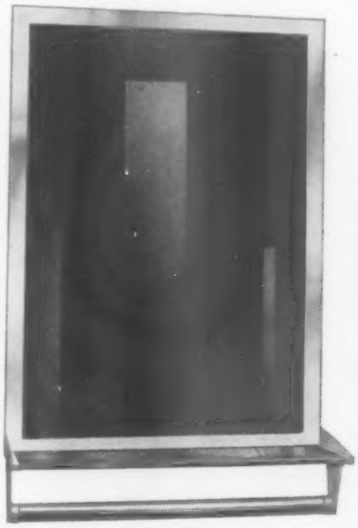
Made from heavy-gauge auto-body steel. Adjustable glass shelves, copper-protected mirrors, nickel-plated hinges, used razor blade drop, toothbrush racks. Finished in high-grade baked enamel. Bevel or plain mirrors may be had in any of these cabinets. Specify type of mirror when ordering.



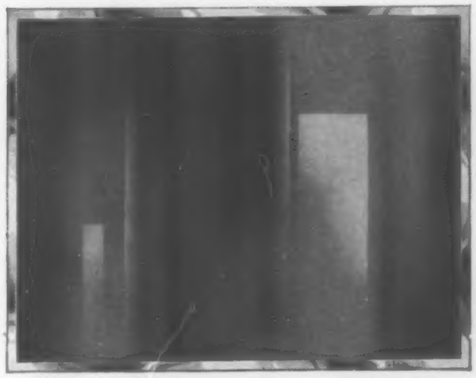
Nos. 200, 220, 250

Nos. 210, 230, 240

Wall Hung Washroom Mirrors . . .



Nos. 907, 908, 909



Mirror No. 10

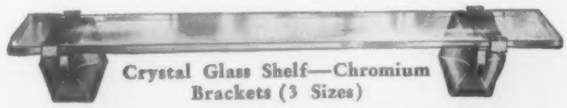
No. 907 is a white enameled, steel framed mirror with towel bar and a projecting glass shelf.

No. 10 is a plain plate mirror set in a brass, chromium-plated frame, channel type. The mirror back is ARMCO steel. Mirror is No. 1 plate glass, copper protected non-electrolytically, guaranteed for five years against silver spoilage.

COLONIAL BATHROOM ACCESSORIES . . . *Recessed and Projection Types*

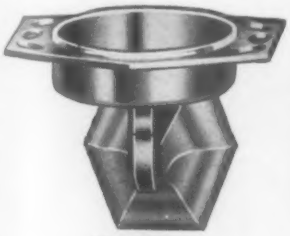
Chromium Hexagon Towel Bar (4 Sizes)

CHROMIUM PLATED



Crystal Glass Shelf—Chromium Brackets (3 Sizes)

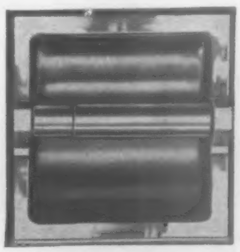
Made of "ZAMAC" Metal, known for its great strength and ability to stand hard usage. Non-corrosive. Triple coated (copper plated, a coating of nickel, a heavy coating of pure chromium). Accessories illustrated are only a few of complete line.



Model 4002
Tumbler—Toothbrush Holder

Model 4023
Tumbler Holder

Model 4008
Robe Hook



Model 4020
Paper Holder

Model 4003
Soap Dish

MUTSCHLER BROTHERS COMPANY

Nappanee, Indiana

PORTA-BILT EQUIPPED HOME ECONOMIC LABORATORIES
A Contribution to Progressive Education

Each bay is a completely contained unit, closely simulating ideal home kitchen conditions

Service and utility lines are concentrated along one wall, reducing remodeling and maintenance cost

Mobile table segments joined for lecture or discussion

Individual tables in position to accommodate family group dining. Circular segments arranged for auxiliary discussion

PORTA-BILT consists of a line of kitchen cabinet units, carefully constructed of selected hard wood, so devised that it may easily be adapted to any condition.

PORTA-BILT enjoys a leadership that is fully justified by the workmanship and time-proven quality that is built into it as a result of the fifty years' experience of its manufacturer.

PORTA-BILT engineers, that they might offer a more concrete contribution, have studied the problems occurrent in Home Economic Laboratory planning from the standpoint of the educator as well as the technician. They have qualified themselves to collaborate with you . . . to intelligently cooperate with your instructors in the development of a laboratory that will provide, practically, adequately, and economically, the facilities required for successful instruction.

The thoroughly efficient laboratory of Dowagiac High School, Dowagiac, Michigan (pictured here), is the direct result of such a cooperation. We should like to tell you more about it . . . and to work with you when you are confronted with a similar problem.

MUTSCHLER BROTHERS COMPANY
Porta-Bilt
KITCHEN FURNITURE
NAPPANEE, IND. U.S.A.

INTERNATIONAL SILVER COMPANY

HOTEL DIVISION, MERIDEN, CONN.

World's Largest Manufacturers of Fine Silverware

New York, 485 Fifth Avenue   Chicago, 6 N. Michigan Avenue   San Francisco, 150 Post Street

For Complete Information See Your Hotel Supply Jobber or Write to Us

WALLACE SILVERSMITHS

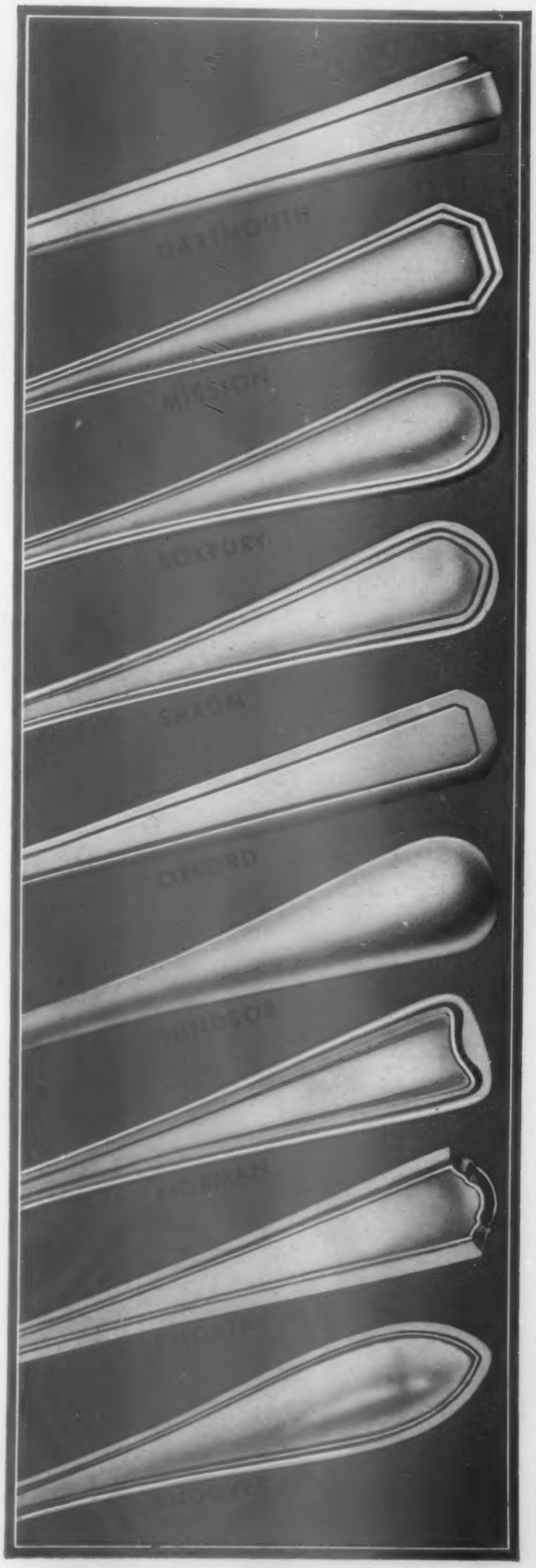
Founded 1835 Wallingford, Conn.

BRANCH OFFICES: New York Chicago San Francisco Los Angeles

WALLACE SILVERWARE — Especially Designed for Institutional Use

Style . . . with stamina. Outstanding popularity and unique manufacturing processes . . . plus consequent volume production . . . account for the range of low prices of the nine flatware designs here shown. Each pattern is made from either a heavy or an extra heavy "blank" of 18% nickel silver and plated with pure silver according to recognized schedules. All nine are worthy representatives of the reliable workmanship and quality so characteristic of the products of this 106-year-old firm of silversmiths.

Another important factor has not been overlooked—simplicity in design insuring easy and complete cleansing.



Buyer's Chart of Prices and Qualities

The prices are NET for Tea Spoons, per dozen. Prices of other staple items would be in proportion. All patterns are regularly butler finished. Write your regular supply house—but if you have any difficulty in obtaining Wallace patterns, write us direct for samples and any further information you may desire.

Dartmouth	Mission	Roxbury	Saxon	Oxford	Windsor	Norman	Choate	Andover	Quality Note—In the descriptions below references are made to "9-lb. blanks" and other weights. This means that a gross of Tea Spoons weighs 9 lbs. . . . etc.
					$1.00 per doz.				The most for the least money. Half Plate . . . Plus. Heavy 9-lb. "blanks."
			$1.05 per doz.	$1.05 per doz.	$1.05 per doz.				Longer wear at slight additional cost. Half Standard Plate—Sectional . . . extra plating at points most exposed to wear, on staple pieces. Heavy 9-lb. "blanks."
					$1.20 per doz.				Less cost over long period of use. 5 oz. Plate (tablespoons) sectional . . . heavier than standard plating; more silver at "wear points" of staple pieces. Heavy 9-lb. "blanks."
					$1.45 per doz.				Same as next above . . . except that "blanks" are 11-lb. extra heavy.
$1.45 per doz.	$1.45 per doz.	$1.45 per doz.				$1.45 per doz.	$1.45 per doz.		Also same as above as to plating schedule . . . but based on "fancy" patterns and extra heavy 10⅓-lb. "blanks."
All prices quoted are for Tea Spoons only.								$2.50 per doz.	Greater economy in the long run. AA Sectional; 6 oz. plate (tablespoons), much heavier than standard, with extra plating at "wear points" of staple pieces. Extra heavy 11⅓-lb "blanks."

All prices subject to change without notice

Here is shown one example of Wallace's large line of hollow ware . . . the No. 0237 Urn, made in two sizes: one gallon capacity, 16½ inches high; and two gallon capacity, 22½ inches high.

With its pleasingly simple lines, its heavy gauge nickel silver base metal (all parts silver soldered), and its high quality finish on extra heavy silver plate . . . this Urn is characteristic of the craftsmanship that has made the Wallace name famous since its beginning in 1835 . . . 106 years ago.

A copy of our catalog, featuring both flat ware and hollow ware, will be sent on request.

THE FORMICA INSULATION CO.

4614 Spring Grove Avenue
Cincinnati, Ohio

• Plastic Table Tops • Counter Panels • Wainscot

● The picture shows an installation of ivory Formica tops in the Woodrow Wilson High School at Washington, D. C. Many installations of Formica tops have been made in the Washington Schools during the past few years

FORMICA TABLE TOPS for school cafeterias have been selected by many leading educational systems because of their attractive appearance, great durability, and because they are sanitary and unusually easy to keep clean. They come in more than 70 colors and may have either extruded metal sections on the edges or Formica edges. They are offered in a cigarette proof grade if they are to be used where smoking is permitted. No linen is required when Formica tops are used.

FORMICA COUNTER PANELS

Formica panels are used on cafeteria counters, soda fountain counters, lunch counters. Here their attractive appearance adds to the decoration of the room. The colors are stable. The surfaces are hard and durable and do not require maintenance.

FORMICA WAINSCOT

Formica is available as wainscot material in the form of a wall board or in the form of $\frac{1}{16}''$ veneer sheet mounted on plywood. Such wainscot is never cracked by settling walls. It can be washed with soap and water, or if necessary with such solvents as alcohol, gasoline, or acetone without injury to the surface.

FORMICA **• Write for literature showing many illustrations of these Formica uses.**

FOR FURNITURE FIXTURES AND BUILDING PURPOSES

MITCHELL MANUFACTURING CO.

Milwaukee, Wisconsin

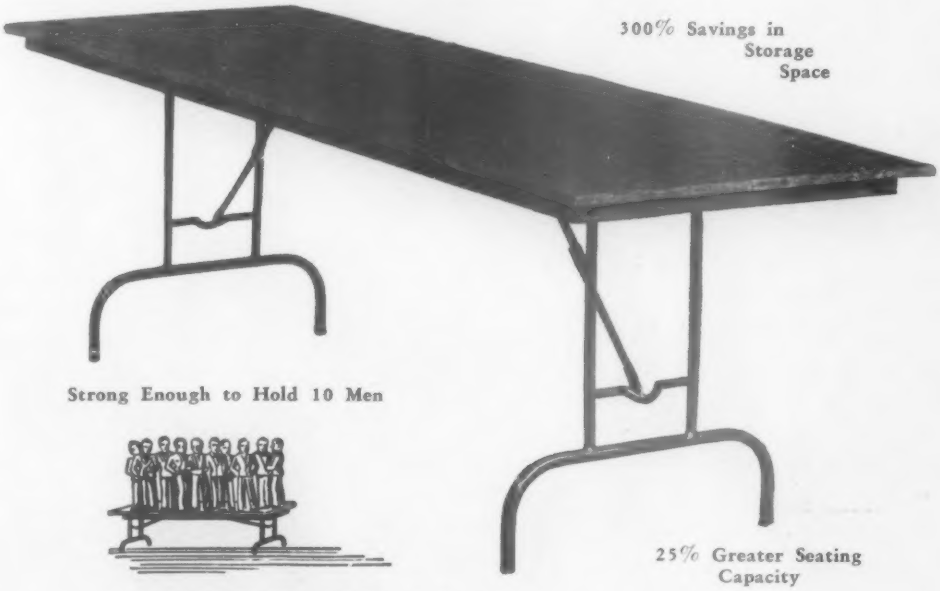
Playground Apparatus
Beach and Pool Equipment
Fold-O-Leg Tables

"Betterbilt"

Folding Choral Stands
Folding Band Stands
Sanitary Barn Equipment

FOLD-O-LEG TABLES

For cafeterias, sewing rooms, study tables, kindergartens, commercial departments, social rooms, recreation centers, table tennis, etc., Mitchell Fold-O-Leg Tables will satisfactorily replace the most expensive type. They are perfectly rigid because of their unique design and construction—yet each table requires only 2½ inches space when folded. Made in convenient sizes. Tops of Fir Veneer, Tempered Masonite Presdwood or Linoleum. Thousands have been re-ordered by old customers who originally tried just one table. Write today for Booklet No. 3.



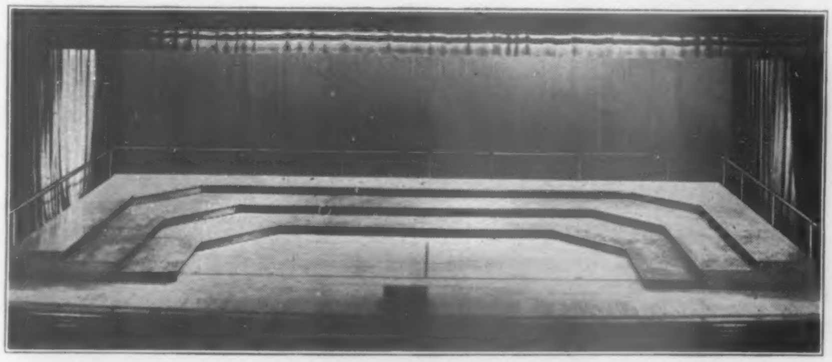
BOOKLETS (Illustrated)

1—BETTERBILT PLAYGROUND APPARATUS—See Page 283
2—BETTERBILT POOL EQUIPMENT—See Page 283
3—MITCHELL FOLD-O-LEG TABLES
4—MITCHELL FOLDING CHORAL STANDS
5—MITCHELL FOLDING BAND STANDS
6—SANITARY BARN EQUIPMENT

STEEL-LEG PORTABLE FOLDING STANDS

FOR BAND, ORCHESTRA AND CHORAL GROUP ELEVATION, ALSO PLATFORMS FOR PLAYS, ETC.

Mitchell Portable Stands can be adapted to any need. Constructed in rigid units easy to handle. Rapidly moved from music room to auditorium stage or even to other places for concert work. Minimum storage space required for folded units and demountable safety steel rail. Available in any size. Thoroughly tested by many outstanding educational institutions. Write today for Booklets No. 4 and No. 5.



PARTIAL LIST OF SCHOOLS NOW USING MITCHELL PORTABLE FOLDING STANDS

Upland Schools, Upland, California
Colorado State College, Greeley, Colorado
Yale University, New Haven, Connecticut
Sterling Morton High School, Cicero, Illinois
Proviso Township High School, Maywood, Illinois
Monmouth Public Schools, Monmouth, Illinois
Michigan State College, East Lansing, Michigan
Board of Education, Ferndale, Michigan
Sarah Lawrence College, Bronxville, New York
St. Joseph's Academy, Mc Sherrystown, Penna.
Orange High School, Orange, Texas
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CHELSEA PRODUCTS

281 11th Avenue, New York

CAFATRAYS

Eleven Popular Sizes for Every School Cafeteria Purpose

CAFATRAYS are ideal for school cafeterias or lunchrooms.

They are made of a special durable composition and are light, tough, attractive, quiet, clean.

They will withstand the hard knocks of everyday service, and the rich burl-grained mahogany finish is a part of the material and goes right through the tray.

In use they eliminate metallic clatter, and the rapid adoption of CAFATRAYS for school feeding everywhere is due to the fact that they combine in the greatest possible degree all the desirable features of the ideal service tray.

Eleven correct sizes provide a tray for every service—but **demand genuine CAFATRAYS.**

Catalogue Number	Size	Weight Packed in Cartons of 1 Doz.	Some Uses
75	4½" x 6½"	2½ lbs.	Infirmary Tray
1344	6 " x 8 "	4 lbs.	Tea Tray
1345	8½" x 11 "	7 lbs.	Nutriment Service
1346	10¾" x 14 "	12 lbs.	Sandwich Tray
1347	12¼" x 16½"	18 lbs.	School Cafeteria
1348	14 " x 18 "	23 lbs.	Standard Cafeteria
1348½	15¼" x 20½"	34 lbs.	Dining Room Tray
1349	16½" x 22½"	48 lbs.	General Food Service
1111	11" Round	8 lbs.	Ice Water Service
1414	14" Round	14 lbs.	Sandwich or Water Tray
1616	16" Round	23 lbs.	Waitress Tray

A FEW REGULAR CAFATRAY USERS

- Princeton University, Princeton, N. J.
- Columbia University, New York City
- Public School Cafeterias, Seattle, Wash.
- Fordham University, New York City
- Villa Maria Academy, Malvern, Pa.
- Eastern Texas State Teachers' College, Commerce, Texas
- Public School Cafeterias, Houston, Texas
- Michigan College of Mining, Houghton, Mich.
- John B. Stetson University, De Land, Fla.
- Mountain Lakes High School, Mountain Lakes, N. J.
- Purdue University, Lafayette, Ind.
- Wyandotte High School, Kansas City, Mo.
- Long Beach Schools, Long Beach, Calif.
- Los Angeles Schools, Los Angeles, Calif.
- Kanawha County Schools, Charleston, W. Va.
- Middletown High School, Middletown, N. Y.
- Oklahoma City Schools, Oklahoma City, Okla.
- Colorado Springs High School, Colorado Springs, Colo.
- Brooklyn College, Brooklyn, N. Y.
- Ohio State University, Columbus, Ohio
- Youngstown Schools, Youngstown, Ohio
- University of Missouri, Columbia, Mo.
- Syracuse University, Syracuse, N. Y.
- Goshen Schools, Goshen, N. Y.
- University of Michigan, Ann Arbor, Mich.
- Weber College, Ogden, Utah
- Washington Township Schools, Piqua, Ohio
- Manhassett Schools, Manhassett, N. Y.
- University of Arizona, Tucson, Arizona
- Louisiana State University, Baton Rouge, La.
- Humboldt State College, Arcata, Calif.
- Appalachian State Teachers College, Boone, N. C.
- Calvin Coolidge High School, Moline, Ill.
- Pittsford High School, Pittsford, N. Y.

AKINS SALES CO., INC.

828 Broadway, New York, N. Y.

Quality Products Which Have Stood the Test for Over 45 Years

PRODUCTS

CHANGEABLE LETTER
- BULLETIN BOARDS
- MENU BOARDS
- HONOR ROLLS
- CLASS SCHEDULES

CORK BULLETIN BOARDS
DIRECTORY BOARDS
CLUB ROSTERS
GOLD HANDICAP BOARDS
IN AND OUT BOARDS
BRONZE TABLETS
BRONZE LETTERS
FLOOR DIRECTIONAL ARROWS
DESK NAME PLATES

CHANGEABLE LETTER MENU BOARDS

Made in various stock sizes, with wood, bronze, nickel silver or satin finish chrome Kalomein frames or solid bronze frame.

All Types of Changeable Letters
Brass White Enamel; Flat Celluloid; Embossed Celluloid; Double Prong
Composition or Cast Aluminum Letters; Single Prong

CAST BRONZE TABLET

Cast bronze tablets, plaques, historical markers, fraternity emblems, and insignia.

DESK NAME PLATE

Cast bronze plate.
Also made with
Wood frame with changeable letters or
Wood block with white embossed lettered card with beveled glass face.

HONOR ROLL BOARD

This honor roll is perpetual, because it uses easily changed letters.

CAST BRONZE OR ALUMINUM LETTERS; STANDARD DESIGNS
CAN FURNISH ANY MATERIAL IN ANY SIZE OR DESIGN

ACME METAL PRODUCTS CORPORATION

1845 West 74th Street, Chicago, Ill. Dover, N. J.

APPROVED BY QUALITY TESTED STEEL KITCHEN CABINET INSTITUTE

Manufacturers of Steel Kitchen Cabinets, Undersink Cabinets, Package-Kitchens, Package Wall and Base Cabinets, Kitchenettes complete with ranges and refrigerators, Ironing Board Cabinets and Accessories. Also distributors of Stainless Steel and Linoleum Covered Sink and Counter Tops

Acme Bonderized Cabinets of Steel For Home Making Department

ACME offers two lines of cabinets of steel—DeLuxe and "Thriftee."

The ACME DeLuxe line is designed with mullions. The cabinet fronts are of butt joint construction. All joints are brazed, ground and polished to a smooth surface with no visible seams or laps.

The ACME "Thriftee" line is designed with flush fronts with no exposed stiles or rails, presenting an unbroken modern appearance. "Thriftee" kitchen cabinets are competitively priced but the quality of materials and finish is the same as the DeLuxe cabinets.

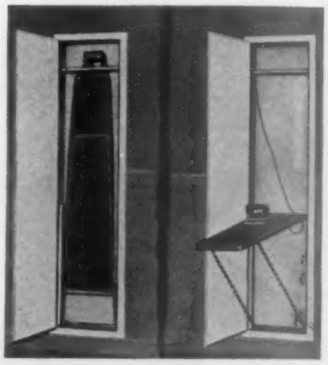
For Home Making Departments either line may be had with Porcelain Enameled Iron—Stainless Steel—Linoleum covered—or Micarta Sink Tops.

ACME Cabinets have passed all the tests by the "Steel Kitchen Cabinet Institute" for excellence of finish—sturdiness of construction—a lifetime of wear with proper care. They are "Bonderized" against rusting.

We have field men in all parts of the country whose services are yours without obligation.

WRITE FOR A COMPLETE ACME MASTER CATALOG
and Steel Kitchen Cabinet Institute Handbook
Explaining Tests

STEEL IRONING BOARD CABINET FOR THE DORMITORY



Recessed into the wall. Shelf for Iron. Board extends 50" from cabinet. Supports 150 pounds.

SPECIFICATIONS

Outside over all 68 x 17 x 5". Inside 65 x 14 x 5". Wall recess required, 65½ x 14¼ x 4¼". Located 9½" from floor.

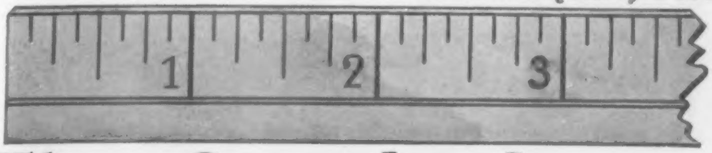
ACME "Thriftee" Cabinets and Linoleum Covered Sink Tops in Home Making Department, Findlay High School, Findlay, Illinois

JOHN SEXTON & COMPANY

Manufacturing Wholesale Grocers

Chicago — Importers — Coffee Roasters — Brooklyn

Edelweiss Quality Foods



The Standard of Comparison

CHICAGO

John Sexton & Co., welcomes comparison with any other food supply service for those who feed many people each day. Check the following facts about Sexton and Sexton service with the corresponding facts about any other similar service.

SEXTON SERVICE	ANY OTHER SERVICE
1. Established in 1883—continuously under Sexton management.	1. ______
2. Responsibility—the highest.	2. ______
3. Superb Service—Daily delivery New York and Chicago. All orders shipped within 24 hours of receipt.	3. ______
4. Coffee Merchants for over 50 years. Direct importations—daily roasting—a saving to you in every pound.	4. ______
5. All fruits and vegetables selected according to Sexton specifications. Uniform number of servings to the tin. All cans chock-full of fully ripened and delicious fruits or vegetables.	5. ______
6. A complete variety of high quality preserves and jellies, gelatine desserts, extracts, baking powder made in Sexton Sunshine Kitchens.	6. ______
7. Sexton pickles, rich in Oriental spices, pickled in pure vinegar and crystal cane sugar in Sexton Sunshine Kitchens.	7. ______
8. Pre-eminent importers of Spanish olives—save buyers one profit.	8. ______
9. Tender leaf teas imported from the Tea Gardens of Japan and India. Sexton teas retain the full volume of essential oils and theine found in the blossomed leaf.	9. ______
10. A large staff of thoroughly trained salesmen, experienced with the needs of those who feed many people each day. A Sexton representative in every state in the Union.	10. ______
11. Endorsed by the National Associations of the various enterprises feeding many people each day.	11. ______
12. The Sexton guarantee of complete satisfaction or money cheerfully refunded accompanies every sale.	12. ______

BROOKLYN

If you are among the vast number of Sexton patrons, you have proved already the convenience and economy of these and other features of Sexton service. From all others we invite a trial order, the severest test you can make

THE ALUMINUM COOKING UTENSIL COMPANY

New Kensington, Pa. — Oakland, Calif.

BRANCHES

Baltimore, Md. · Boston, Mass. · Chicago, Ill. · Cleveland, Ohio · Kansas City, Mo. · Minneapolis, Minn. · New York, N. Y. · Philadelphia, Pa.

"Wear-Ever" Gas Heated Steam Jacketed Kettle

"Wear-Ever" Small Trunnion Kettle

"WEAR-EVER" STEAM JACKETED KETTLES

These seamless kettles are sanitary because they are made of dense, non-porous, extra thick, hard wrought sheet aluminum which resists the actions of fruit and food acids, without at any time forming a poisonous compound with them or affecting their taste, odor or color. They are easily kept clean.

On account of the high heat conductivity of aluminum, "Wear-Ever" kettles pass heat rapidly and give products quick even cooking. Fuel is saved because less steam pressure is required; time is saved because they heat quickly.

"Wear-Ever" jacketed kettles actually cost less than other high grade kettles. Valuable not only for general work, they may also be used for roasting or for waterless cooking. Many sizes and styles are available.

"WEAR-EVER" ALUMINUM TRAYS

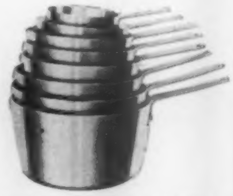
After years of scientific research, metallurgists have developed a formula for a new aluminum alloy for trays, combining all of the ideal qualities for cafeteria service. Come in eight sizes—natural or with the Alumilite Finish. We invite you to put these trays to a service test.

"Wear-Ever" Aluminum Tray

"WEAR-EVER" RANGE UTENSILS

The "Wear-Ever" line of heavy duty aluminum ware includes everything needed in the form of range utensils—sauce pans, sauté pans, stock pots, etc.—all made of thick sheet aluminum,—every utensil made from a single piece of metal without joints or seams and with extra thickness of metal where needed to resist wear. For full information regarding heavy duty and semi-heavy range utensils, see your supply house or write for catalog.

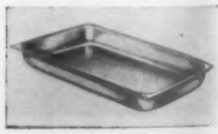
"Wear-Ever" Heavy Duty Stock Pot



"Wear-Ever" Semi-Heavy Sauce Pans

"WEAR-EVER" PITCHERS WITH COOL HANDLES

"Wear-Ever" pitchers are available in capacities from 1 to 4 qts. They permit easy and comfortable handling of hot and cold liquids.



"Wear-Ever" Rectangular Steam Table Pan

A complete "Wear-Ever" catalog is available. Send for your free copy to The Aluminum Cooking Utensil Co., 11th St., New Kensington, Pa.

THE CLEVELAND RANGE CO.

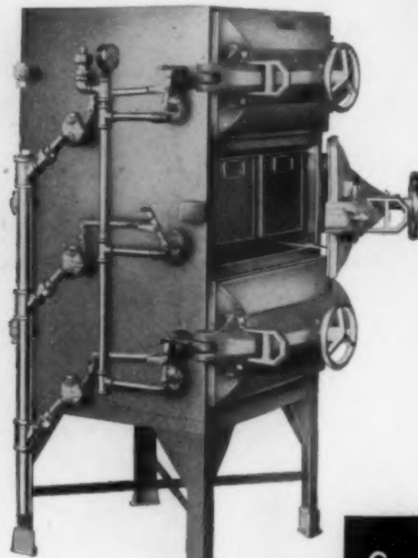
Cleveland, Ohio

STEAM-CHEF STEAM COOKERS

for all School, College and Institution Kitchens. Direct Steam—Gas—Electric Operation

BUILT by specialists on steam cookers, STEAM-CHEF Steamers are the result of many years' experience with school and college requirements. They are today successfully serving hundreds of leading educational institutions the country over. A STEAM-CHEF Cooker embodies ALL approved modern features of construction. It is an effective saver of time, space, work and fuel. Always ready for action, it frees your range top for other purposes, and can be used for many foods now prepared in other ways. The STEAM-CHEF is designed for convenience and ease of operation. The average person can quickly get maximum results. There is a proper STEAM-CHEF model, operated by direct steam, gas, or electricity, to fit your individual requirements, whatever they are. To retain palatability, natural food elements, and nutritive values, steaming is a method of cooking accepted by the highest authorities. To obtain steaming at its best, be sure your equipment is the most efficient and up-to-date—that means STEAM-CHEF.

Send for interesting booklet "Getting the Most from Steam Cooking"



MODEL 101-3B
Cleveland "Steam-Chef"
Direct Connected Unit

Body Construction — One-piece welded bodies of heavy plate steel, rust-proofed or stainless, easy to keep clean and sanitary, insuring low maintenance cost and extra durability.

"Full Floating" Doors—An exclusive Steam-Chef feature, always seat perfectly, never require adjustments, prolong gasket life.

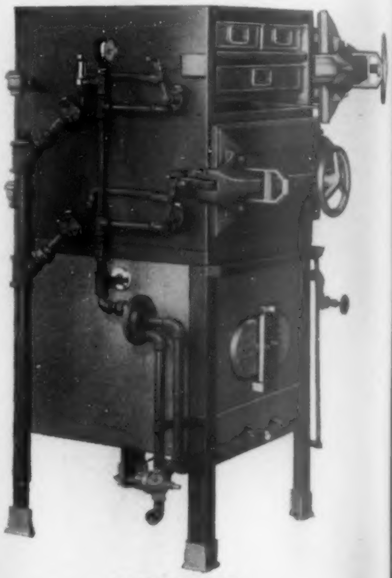
Safe Operation — Maximum safety results from doors which cannot be opened while steam is being admitted to compartment.

Synchronized Thermostatic Control—Achieves new economy and convenience. Eliminates necessity for steam vent line and cuts steam consumption 50% to 80%.

Automatic Control—of both fuel and boiler water level is provided on gas and electric units—an exclusive feature, effecting fuel saving of 33⅓%.

Sizes and Types—Over 50 models, sizes and types—capacities 2 to 7½ bushels per charge—standard units to fit practically any requirement.

Cleveland STEAM-CHEF
for better cooking--STEAM



MODEL 2-SB
Full automatic gas operated "Steam-Chef." Gas and water automatically controlled

PROMINENT SCHOOL INSTALLATIONS

Dartmouth College, Hanover, New Hampshire
Cornell University, Ithaca, New York
Syracuse University, Syracuse, New York
University of Texas, Austin, Texas
Purdue University, Lafayette, Indiana
Vassar College, Poughkeepsie, New York
Ohio State University, Columbus, Ohio
Northwestern University, Chicago, Illinois
University of Wisconsin, Madison, Wis.
University Dining Halls, Princeton, New Jersey
University of Michigan, Ann Arbor, Michigan
A. & M. College of Texas, College Station, Texas
University of New Mexico, Albuquerque, New Mexico
Hunter College, New York, N. Y.
Duke University, Durham, North Carolina
University of Indiana, Bloomington, Indiana
University of Minnesota, Minneapolis, Minnesota
Michigan State College, East Lansing, Mich.
Mellon Jr. High School, Mt. Lebanon, Pennsylvania
Preston School of Industry, Ione, California
Cranwell Preparatory School, Lenox, Massachusetts
Madison College, Harrisonburg, Virginia
Kearney State Teachers College, Kearney, Nebraska
Louisiana Polytechnic Institute, Ruston, Louisiana
University of Akron, Akron, Ohio
Bellingham High School, Bellingham, Washington
Bryn Mawr College, Bryn Mawr, Pennsylvania
Mark Keppel High School, Alhambra, California
Everett High School, Everett, Washington
Brooklyn H. S. for Homemaking, Brooklyn, New York
Kalamazoo College, Kalamazoo, Michigan
Garfield High School, Los Angeles, California
Senior High School, Billings, Montana
Arthur Hill School, Saginaw, Michigan
Salem High School, Salem, Washington
Port Richmond High School, Richmond Borough, New York
University of Maine, Orono, Maine
Chicago Board of Education, various locations
Brooks School, North Andover, Massachusetts
Swarthmore College, Swarthmore, Pennsylvania

[Complete information and detailed specifications will be furnished on request. Sold through recognized kitchen equipment dealers everywhere.]

EDISON GENERAL ELECTRIC APPLIANCE COMPANY, INC.

5600 West Taylor Street, Chicago, Illinois

MANUFACTURERS OF

COMMERCIAL EDISON Hotpoint EQUIPMENT

Announce THIS ECONOMY FOURSOME IS SOLVING THE FOOD SERVICE PROBLEM FOR MANY SCHOOLS, HOSPITALS, AND INSTITUTIONS

THE "BRAWNY LAD"

NEW LOW PRICED COMMERCIAL RANGE

A low priced range of commercial construction and wide adaptability, the "Brawny Lad" is designed to fit installations where the heavy construction, large capacity, and higher cost of standard commercial ranges are not justified, yet where long hours use and institutional conditions render domestic type ranges unsuitable. In this classification fall the diet kitchen, the small hospital, the smaller school lunch room, and the community house where food is prepared to serve from ten to fifty persons per meal.

"Brawny Lad" has a large, fast automatic oven and may be equipped with four Hi-Speed Calrod surface units, two such units and a 12" x 24" automatic griddle, or a single 24" x 24" automatic griddle.

Also Husky and Champ ranges for heavier service.

THE "HUSKY" OVEN

FOR ALL KITCHEN OPERATIONS

Now your kitchen can have that automatic temperature and directional heat controlled electric oven you have wanted so long. For these new "Husky" all purpose kitchen ovens are well within the reach of the average institutional budget. From angel cake to roasting turkey, they will do a splendid all round baking or roasting job for you. Then too, they are exceptionally fast—have that flash heat and punch to put the Chef through an unexpected swamping rush. Individual control of top and bottom heat, adjustable automatic temperature control, and each deck a separate oven make these the most useful to you. Available in one, two or three decks.

Also a full line of baking and roasting ovens.

THE "HEAT MANAGER" SYSTEM

OF MODERN HOT FOOD STORAGE

Think of holding mashed potatoes good for 8 hours — keeping cream of tomato soup without a sign of "breaking" all day. The secret — Edison-Hotpoint Electric Hot Food Storage Receptacles keep each food at its proper temperature — individually controlled by thermostats, easily adjusted for various foods. They do away with dripping valves, rusted water pans, and clouds of steam—provide convenience and comfort for help as well as patrons—practically a necessity where rooms are air conditioned. These units are solving the hot food service problem for leading hospitals, schools, and commercial establishments. Ask your kitchen equipment house for a quotation. They will build tables or carts with these units to suit your individual requirements.

Or write us for further information.

THE "HEAT MANAGER"

LOW PRICED AUTOMATIC FRY KETTLE

Those luscious, golden brown, perfectly fried foods, literally "baked" in deep fat, add zest and pleasing variety to the general diet hospital tray or the school lunch. Many Hospitals and Schools, presided over by nationally known Dieticians use and endorse these accurately temperature controlled, fat saving Edison-Hotpoint electric fry kettles. The new fry kettle shown here is astonishingly low in price and even more surprisingly economical on both fat and electric energy consumption. Find out WHO uses and endorses EDISON-Hotpoint products before you buy.

Also other models for counter and kitchen.

"WE HAVE THE MOST COMPLETE LINE OF AUTOMATIC ELECTRIC COMMERCIAL RANGES, BROILERS, BAKING AND ROASTING OVENS, STOCK AND FRY KETTLES, GRILLS, GRIDDLES, WAFFLE BAKERS, HOT FOOD STORAGE UNITS."

FOR SALE THRU LEADING KITCHEN EQUIPMENT HOUSES

STANDARD GAS EQUIPMENT CORPORATION

18 East 41st Street, New York

Other conveniently located offices at Boston, Philadelphia, Baltimore, Aurora, Ill., Chicago, New Orleans, Los Angeles

FUEL AND FOOD SAVINGS SOON PAY for New Vulcan Cooking Equipment

Vulcan Super Radial-Fin construction cuts top costs as much as 20%. Insulation and automatic heat control make equally important fuel savings in range ovens. The new exclusive Vulcan solid-deck, taking the place of the old bar rack, enables the cook to convert the single oven into a "double-decker" with two perfectly heated ovens in one for pans of hash, boned roasts, etc.

Cooks can do more work in this new Vulcan Range oven with the same amount of gas.

Compare Vulcan construction with other types of construction. Examine its sturdier, heavier nickel-chrome alloy top castings, its longer-life broiler and oven burners, its extra weight and strength wherever needed. All mean lower upkeep costs and long years of uninterrupted service.

Write for complete catalog HB-1 with recommended layouts for hospital kitchens, and information on Vulcan Kitchen Planning Service.

ROUGHING-IN DIMENSIONS

	Wide	Deep	High Overall	Size of Manifold
(F) Broiler	31⅛"	41¼"	72"	1¼"
(Available also in 35" deep models)				
(E) Deep Fat Fryer	15 9/16"	41¼"	39¼"	1¼"
(Available also in 35" deep models)				
(A, B, D) Ranges	31⅛"	41¼"	72"	1¼"
(Available also in 46¾" wide as well as 35" deep models with Radial-Fin Top, Open Top, Fry Top and Even Heat Top)				
(C) Expando Units	15 9/16"	41¼"	32¼"	1¼"
(Five types of tops; available also in 35" models)				

C

G

G—NEW SECTIONAL BAKE OVEN—Each deck has its own burner and automatic heat control. Heavily insulated. Patented multiple heat conduits assure even heat. Complete information and dimensions on request.

C—NEW "EXPANDO" UNITS—Connect in battery and provide additional top area at a fraction of the cost of a complete range. 31⅛" wide. Can be connected right, left or both sides.

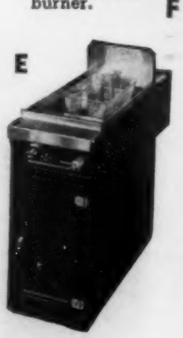
NEW SUPER RADIAL-FIN TOP

Saves up to 20% on top cooking costs. New ventilated ring and cover plate and deep fins speed up top heating, improve heat distribution, provide larger cooking area. New angle-drilled burner gives increased center heat. *An exclusive Vulcan patent.*

E—NEW DEEP FAT FRYER—Heats faster, cooks better, with only half the grease required by former models. Four sizes. Single and double units. Capacities 30 to 116 lbs. fat.

F—NEW CERAMIC BROILER—Clean, flush front. New center burners project flames to sides across ceramic radiants, giving superior, faster broiling qualities. Large elevated oven heated by broiler burner.

E



F

S. BLICKMAN, INC.

Manufacturers of Food Service Equipment for Schools and Institutions EST. 1889 WEEHAWKEN, N. J.

How One of America's Largest Universities *STREAMLINED* for serving 2000 MEALS A DAY!

BEFORE: *Cafeteria at Johnson Hall, Columbia University, before re-design. Note U-shaped counter and the two building columns "A" and "B" protruding in front of it.*

AFTER: *View of same room after re-planning by Blickman engineers. Note the clean design and orderly arrangement and how building columns "A" and "B" have been relegated to a position in work space behind counter, in the new layout.*

THE PROBLEM:

Traffic was slow around the U-shaped counter in the cafeteria at Columbia University's Johnson Hall. Service aisles were congested. Building columns protruded in front of the counter, further obstructing passage of students.

OBJECTS OF RE-DESIGN WERE:

1. To speed up service by increasing counter capacity and the traffic aisle area, without using additional floor space.
2. To provide facilities for combining self-service during breakfast and luncheon and table service for dinner.

THE SOLUTION:

Blickman engineers found that by reversing the entire plan and establishing the traffic aisle in the area formerly occupied by the work space behind the original counter, they could make these improvements:

1. Design a straight counter, eliminating bends and speeding up the flow of traffic.
2. Increase effective counter length, giving greater counter capacity.
3. Change the layout so as to relegate the building columns to a position in the work space behind the counter — completely out of the way.

To insure permanence and ease of cleaning, Blickman Stainless Steel equipment was used throughout. Note the splendid appearance achieved by the clean design and orderly arrangement. This is the kind of straight thinking that Blickman engineers bring to every problem. Their 50 years of experience will be helpful on your next project.

Write to Department AS-1 for catalogs covering any items of equipment in which you are interested.

THE HOBART MANUFACTURING CO.

Makers of Electric Food-preparing and Dishwashing Machines for Commercial and Institutional Kitchens and Bakeries

Troy, Ohio

ATLANTA, GA., 336 Marietta St., N. W.
CHICAGO, ILL., 61 Wacker Drive
DALLAS, TEXAS, 2034 Commercial St.

LOS ANGELES, CALIF., 412 S. Los Angeles St.
NEW YORK, N. Y., 71 Madison Ave.

SAN FRANCISCO, CALIF., 929 Mission St.
ST. LOUIS, MO., 1935 Washington Ave.
SEATTLE, WASH., 2208 Second Ave.

CANADA: Head Office, 119 Church St., TORONTO

SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES (Consult Telephone Directory)

HOBART FOOD MACHINES ARE SOLD THROUGH LEADING KITCHEN OUTFITTERS

Illustrations show representative models only; each line of Hobart Machines comprises a range of sizes to fit any application, from the smallest to the largest school kitchen

Hobart Mixers

Built in 3, 5, 10, 12, 15, 20, 30, 40, 60, 80 and 110-quart bowl capacities. They mix, beat, whip, blend, mash. With attachments they chop grind, slice, shred, grate, crumb, sieve, strain, etc.

Hobart Air Whip Attachment (for Hobart Mixers only) supplies advantages in regular mixing bowl operations, by better aeration; improves cake quality tremendously; reduces mixing time as much as 30% to 40%.

Hobart Glass and Dish Washers

Automatic and semi-automatic models. They wash all tableware **clean,** with a high degree of sanitization, in the shortest possible time. They carry such exclusive features as Revolving Wash Arms and the patented Dual-Drive Conveyor.

Hobart Slicing Machines

Hobart Slicing Machines are ideal for all boneless meats, hot or cold, cooked or uncooked, bread, cheese, vegetables, fruits, etc. Convenient to operate, speedy, quiet, and easy to clean. Maximum safety. New model has Alumilite finish and Hobart Stay-Sharp Stainless Steel Knife.

Hobart Air Whip Unit

Introduces a superior method of whipping cream. In a few seconds it produces 3 or more quarts of whipped cream from 1 quart of liquid cream. It whips by air, keeping all the freshness and sweetness of the cream. More and better whipped cream dishes can be made at less cost.

Hobart Potato Peelers

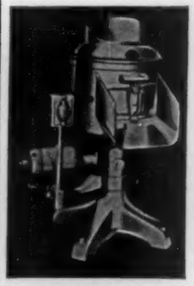
Bring new savings in time and food costs. There are four sizes, with capacities of from 8 to 45 lbs. Quiet, speedy and watertight, they peel potatoes and all root vegetables "in no time," with negligible peel loss.

Hobart Food Cutters

Embody distinct advances in speed, thoroughness, safety, ease of cleaning, and economy of space. They cut up meats, vegetables, firm fruits, cocoanuts, citron, nuts, boiled eggs, beets—practically anything in the food line, uniformly in a few seconds' time.

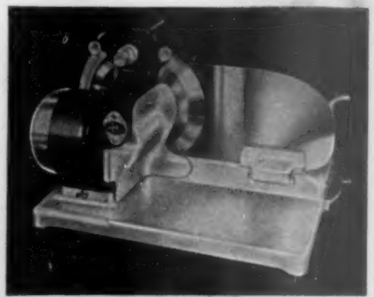
GUARANTEE AND SERVICE

All Hobart Machines are fully guaranteed and serviced by **one** nation-wide organization. This avoids uncertainty, confusion and money-losing delays.



Peelers

Air Whips

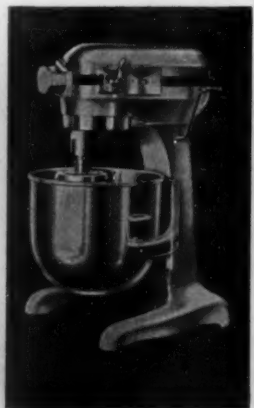


Food Slicers

Food Cutters

Dishwashers—*Left:* Compact, low-priced heavy-duty unit, "LM" *Center:* "AM-5" de luxe. *Right:* "XM-2," fully automatic

Mixers—*Left:* A-200, "two mixers in one" —20 and 12-qt. bowls. *Right:* M-80 Super Mixer



JOHN E. SMITH'S SONS COMPANY

50 Broadway, Buffalo, N. Y.

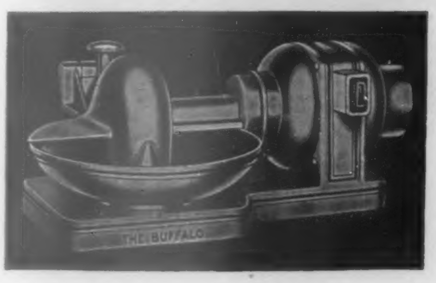
Manufacturers of Time Saving BUFFALO Food Cutters, Meat Choppers, Vegetable Slicers and Bread Slicers

BUFFALO FOOD CUTTERS

Any School kitchen, regardless of size, can reduce expense by installing a Buffalo Food Cutter. The savings in time and the reduction of waste have returned the cost of the machine many times over in hundreds of School kitchens. Buffalo Food Cutters are built in 7 sizes to fit varied requirements. All operate on the same principle—with crescent shaped knives cutting against a curved, slowly revolving bowl. The sheer, draw cut prevents mashing and improves the texture of the food. Any food—meats, vegetables, fish, fruits, etc., can be chopped equally well. Grinder and vegetable slicing attachments are available with all models. All Buffalo Food Cutters are equipped with safety switches and the knives are fully protected.

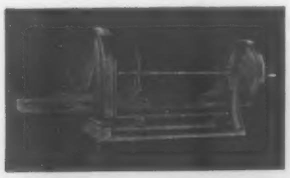
MODEL 120 BUFFALO FOOD CUTTER provides the exclusive Buffalo Self-Emptying feature. It is an easily operated, thoroughly sanitary device—simply a hole in the bottom of the bowl and a leak-proof plug which, when raised, allows the food to drop into the pan below. The entire operation is a matter of seconds and since the food need not be touched, there is no possibility of injury to the operator.

Capacity of bowl:	20 Pounds of meat
Motor:	1 H.P., fully enclosed, ball bearing type

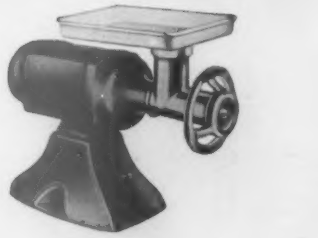


MODEL 114 BUFFALO FOOD CUTTER is designed for small kitchens. It has a bowl capacity of 7 pounds of meat. By swinging back the top plate the bowl lifts out for cleaning. Model 114 is available with or without pedestal. Equipped with ⅓ H.P. ball bearing type motor.

THE BUFFALO VEGETABLE SLICER is a sturdy, compact unit designed for a variety of purposes. It will slice or grate nearly all kinds of fruits, vegetables, nuts, etc. In addition to various slicing and grating discs, it can also be equipped with a meat grinding attachment. ⅓ H.P. motor.



THE BUFFALO BREAD SLICER saves two to three slices per loaf over hand slicing. It automatically feeds the loaf to the knife and cuts uniform slices at a rate of 175 to 200 per minute. The thickness of slice can be adjusted from ⅛" to ⅞". Made in 3 sizes, hand or power driven.



THE BUFFALO MEAT CHOPPER cuts clean with no backing up or mashing. It is fast, convenient, thoroughly dependable and entirely safe. It is available in 5 sizes with capacities of from 3 to 15 pounds per minute.

Ask Your Kitchen Equipment Dealer about Buffalo Machines or Write Direct for Catalog

THE JOHN VAN RANGE CO.

525–555 Culvert Street, Cincinnati, Ohio

Partial View, Main Kitchen, Students Union, University of Cincinnati.

Harry Hake & Harry Hake, Jr., Architects

THIS KITCHEN *by* JOHN VAN RANGE

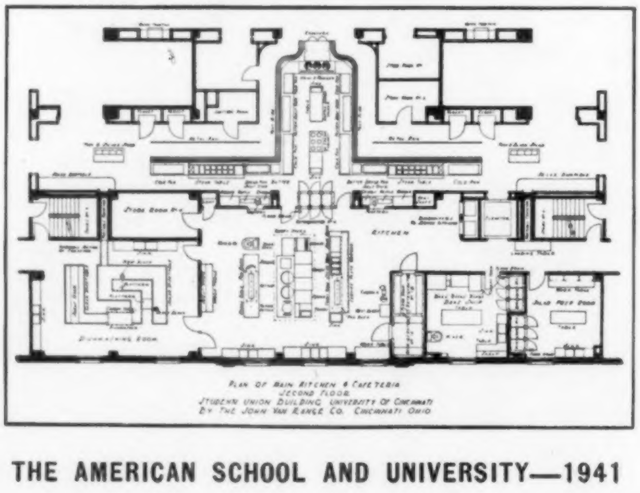
Feeds 2000 Hungry Students Daily

WHEN provisional plans of the new Student Union Building for the University of Cincinnati, were approved, John Van kitchen engineers, called in, collaborated with the architects and the management and made provision for food service that is probably unsurpassed by any educational institution.

Except for a few John Van manufactured units taken from the original college commons, the entire new equipment for main kitchen, faculty kitchen and soda grille was engineered, designed, manufactured and installed by John Van Range.

Two thousand meals served daily range from hurried snacks to formal banquets—all without hurrying, confusion, waste of steps, loss of time. Prices have been kept within the modest means of the students, but the increased volume enables the University to operate food service without financial loss.

Whether your problem is one of modernizing present food service equipment, of replacing obsolete units or of creating an entire new layout, we shall welcome your inquiries.



STANDARD KITCHEN ITEMS

Ever on the alert to improve all items of food preparation and service equipment, John Van engineers have stream-lined the very latest model steamer, here shown, which makes it easier to keep clean. The doors on the improved model have inner doors which are fitted with extra large size, long life gaskets which are adjustable to the steamer body, and are easily replaceable. A gutter built into the body takes care of any condensation from the door when it is opened. The pressure type steamer operates at pressures from 7 to 15 pounds, is available in two, three or four compartments, constructed of steel hot galvanized, aluminum, stainless clad or solid stainless metal. This type of steamer also available for operating with gas instead of steam.

Exclusive John Van safety lock makes it impossible to open doors while steam is on.

TYPICAL JOHN VAN INSTALLATIONS

Boston Public Schools	Boston, Mass.
Holy Cross College	Worcester, Mass.
Providence College	Providence, R. I.
Brooklyn Technical High School	Brooklyn, N. Y.
Pennsylvania State College	State College, Pa.
University of South Carolina	Columbia, S. C.
North Carolina State College	Raleigh, N. C.
Duke University	Durham, N. C.
Fort Thomas City Schools	Fort Thomas, Ky.
University of Texas	Austin, Texas
University of Colorado	Boulder, Colo.
University of Nebraska	Lincoln, Nebr.
Purdue University	Lafayette, Ind.
Thomas Carr Howe High School	Indianapolis, Ind.
Hanover College	Hanover, Ind.
Central High School	Cleveland, Ohio
University of Cincinnati	Cincinnati, Ohio
Lane Technical High School	Chicago, Ill.
University of West Virginia	Morgantown, W. Va.
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Consider these advantages when you specify REZISTAL STAINLESS STEEL for equipment or decoration:

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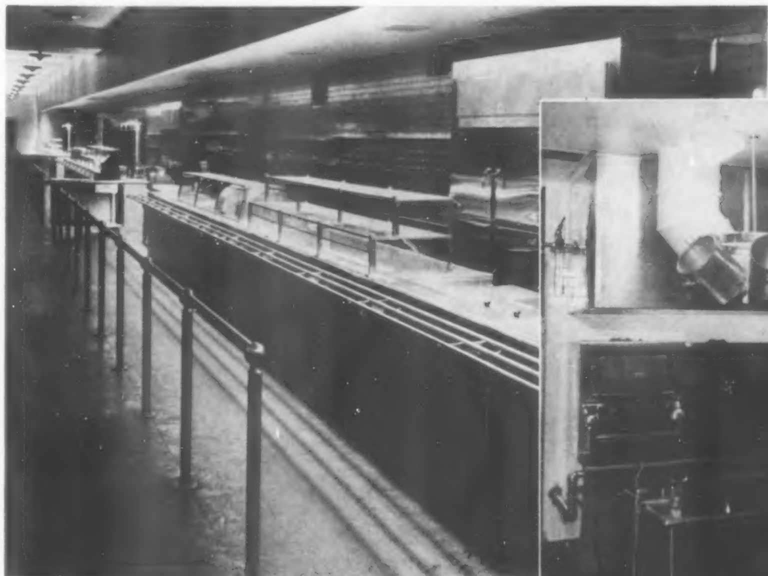

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Modern Sanitary Kitchen Equipment, made of Rezistal Stainless Steel
Hunter College, New York City

SECTION X
LABORATORY DESIGN AND EQUIPMENT

THE SERVICING OF PHYSICS LABORATORIES AND THE MANAGING OF PHYSICS STORES

By FOSTER STRONG

Norman Bridge Laboratory of Physics, California Institute of Technology

THE general problem covered by the title to this article falls rather naturally into three parts: the servicing of undergraduate laboratories; the servicing and instrumental supervision of research laboratories; and the supervision of the stockroom. Not all three parts will apply in the same proportion to any two schools: in a large university with extensive programs both in undergraduate teaching and graduate research all three aspects of the problem will be there to such an extent that it may be necessary to employ at least one man for each field; whereas in a small school devoted mainly to undergraduate teaching, one man may successfully handle all three problems and teach in addition. Even in fairly large schools, one experienced man may handle all three functions satisfactorily, but it will be more systematic to discuss each of the three functions as if it were a separate job.

The Servicing of Undergraduate Laboratories

Of the three functions listed above, the servicing of undergraduate laboratories responds most easily to planned routine handling. The requirements develop according to a regular program, and the work involved can be plotted well in advance. The essentials are simple and definite: sufficient apparatus must be available to cover instructional needs; this apparatus must be so stored that it is easily available when wanted; it must be checked regularly for correct operation and kept in good repair; its operation in the laboratory must be supervised by instructors who understand it; means must be provided by which one can obtain, and at the same time be held responsible for, miscellaneous supplies needed; and an orderly routine for replacing diminishing stocks must be followed. No solution to the undergraduate laboratory problem is unique; other factors not mentioned above will differ for each laboratory. However, any solution that adequately satisfies all the requirements listed should be a successful solution.

Here at the California Institute the freshman physics laboratory occupies a large room on the third floor of the east wing of the physics building; the sophomore physics laboratory is on the second floor of the same wing. Fig. 1 is a floor plan of one corner of the freshman laboratory, showing the adjoining storage room; the floor plan of the sophomore laboratory is similar. The storage room is arranged to house all the apparatus used in the laboratory to which it is attached. All the equipment for a particular experimental set-up is grouped together on a shelf in one of the cabinets; small parts that might be scattered easily being placed in labeled cardboard boxes. There are two exceptions to this statement: laboratory stands, bench clamps and rods, and similar pieces of equipment that are used for a number of different experiments are stored in an open rack; large pieces such as free fall apparatus and force tables are stored in an open floor area. For convenience in locating, these set-up groups are placed in the cabinets in numerical order; that is, the apparatus for experiment 1 is on shelf A, cabinet 1, shelf B of cabinet 1 holds apparatus for experiments 2 and 3, etc. Pasted on the glass doors of the cabinets, in front of each shelf, is an inventory of what that shelf should contain. The cabinets are kept locked; keys are distributed to the laboratory instructors at the beginning and collected at the close of the school year.

The amount of apparatus to be taken care of will depend upon the teaching method in use at any particular school. Some schools the writer knows of believe in complete coordination between laboratory and classroom, so that the laboratory work is limited to exactly the experiment illustrating the class work being done at that time. This method has some advantages, but either it calls for a large inventory of

duplicate laboratory set-ups, or, if the duplication is kept to a reasonable number, it necessitates too large a group working at each set-up for each student to obtain the maximum benefit from that experiment. The writer also knows of at least one example of the opposite extreme: in this particular laboratory there exists only one set-up of each experiment, all experiments are mounted out in the laboratory permanently, and the student groups rotate around the laboratory during the year. Any discussion of the differences of such teaching methods is out of place in this article; each school's problem will be different, and will be affected by factors of textbook used, number and quality of teaching staff, type and number of students in the class, and the money and space available for the student laboratory.

At the California Institute the method used lies somewhere between the two extremes pictured above. Physics is a required subject for all students the first two years. Both the freshman and sophomore texts are of the type that contain laboratory experiment instructions as an integral part of the material given. The average chapter contains either two or three separate laboratory experiments. The experiments in two consecutive chapters are set up at one time, so that usually five experiments are available simultaneously. Since the student sections are limited to twenty students, two students to a laboratory team, only duplicate set-ups are required for each experiment. The teaching schedule allows two weeks per chapter, so that usually five experiments must be finished in four weeks. The laboratory work occupies one three-hour period per week for each student. With competent laboratory supervision, most experiments can be done at the rate of two per period. This does not include reducing data and writing up the report, which is done on outside time. Thus three out of four laboratory periods are devoted to experimental work; the fourth period is used either for review or for a three-hour examination.

Every four weeks an instructors' meeting is called in the laboratory. Just prior to this meeting, the storekeeper takes down all the experimental set-ups that have been in use, and puts the apparatus back in order in the proper places in the cabinets. By doing this he is able to check the condition of the equipment. Apparatus needing minor repairs or adjustments is taken down to the shop for immediate attention; major repairs are held over until summer unless the apparatus will be needed sooner. Thus the instructors' meeting starts with a clear laboratory. At this Institute the laboratory instructors are usually graduate students without previous experience in this laboratory, which means that they must become familiar with the next experiments at this meeting. At the meeting, which is in charge of the professor supervising undergraduate physics courses, the instructors take out of the cabinets, and assemble ready for use, the equipment for the experiments for the next four weeks. The storekeeper usually attends the meeting in order to point out to the instructors any particular operating feature or weakness of the apparatus that past experience has indicated should be watched. Also to aid the instructors, both at this time and during the laboratory periods, an instructors' bulletin board is placed on the wall in the storage room (see Fig. 1). On this board is a file of sheets, at least one sheet to an experiment, together with whatever diagrams or photographs are required to make the experiment clear, any constants of the apparatus that are needed, and whatever operating comments experience indicates are useful. In addition, 3 x 5 cards giving data and information for the students' benefit are placed in metal holders near the set-ups.

There is one exception to the statement above that everything necessary for the experiment is kept in the storage cabinets and put out for use at the time of the set-up. Valuable small measuring instruments such as micrometer calipers and tachometers, weights for analytical balances, thermometers, valuable small pieces such as platinum wire frames for the surface tension experiment, and all small glassware, are kept in the stockroom. Students requiring these things come to the stockroom at the beginning of the lab-

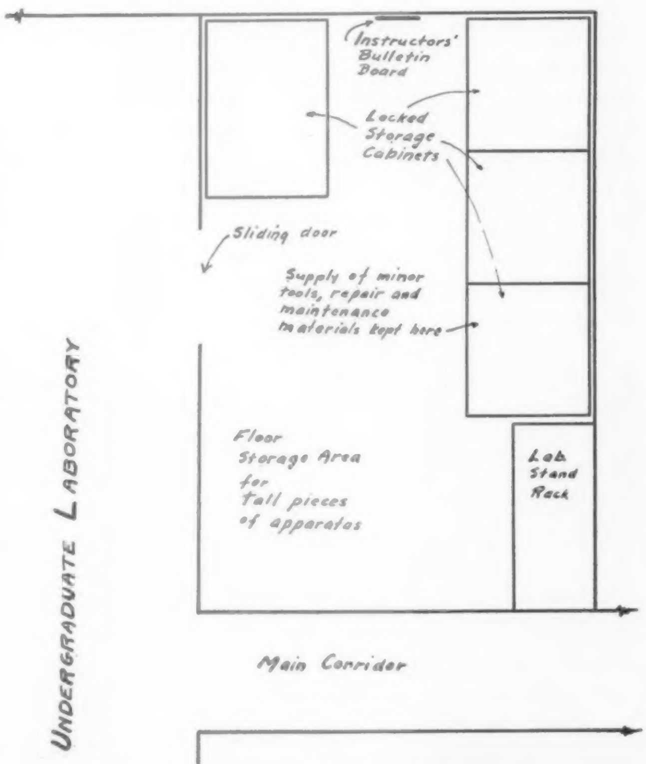
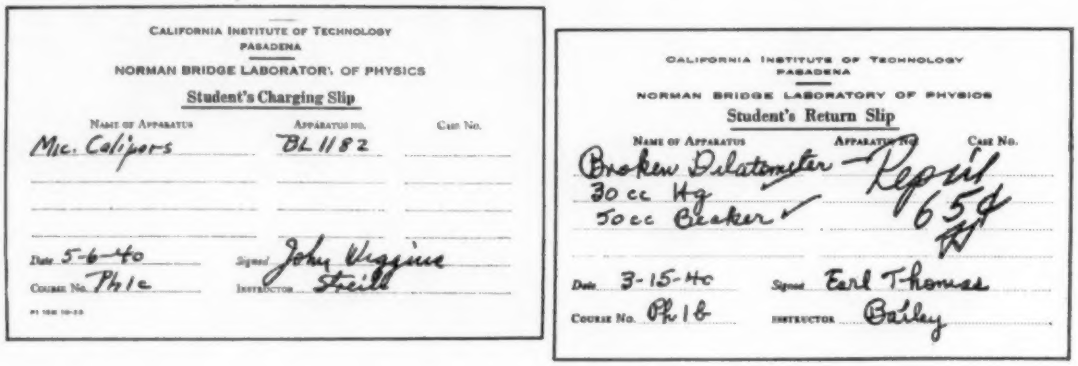


Fig. 1—A corner of the freshman laboratory


CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA
NORMAN BRIDGE LABORATORY OF PHYSICS
Student's Charging Slip

Name of Apparatus	Apparatus No.	Case No.
Mic. Calipers	BL 1182	

Date 5-6-40 Signed John Viggins
Course No. Ph1c Instructor Streib

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA
NORMAN BRIDGE LABORATORY OF PHYSICS
Student's Return Slip

Name of Apparatus	Apparatus No.	Case No.
Broken Dilatometer — Repair		
30 cc Hg		
50 cc Beaker ✓		65¢

Date 3-15-40 Signed Earl Thomas
Course No. Ph1b Instructor Bailey

Fig. 2 — Charging and return slips must be presented and signed in connection with the temporary use of experimental equipment

oratory period and sign out for them on the charge slips provided. (See Fig. 2.) Students are required to return all such material promptly at the end of the laboratory period, signing in on the return slips, also shown in Fig. 2. At this time any damage or breakage is noted on the return slips. The cost of repair or replacement is noted on the return slip by the storekeeper, and the return slip is then used as a charge against the student. (The sample return slip shown in Fig. 2 indicates that a student returned a dilatometer broken, and that the student was charged 65 cents, covering the cost of repair by the Institute glass blower.)

The amount of experimental equipment kept in the stockroom to be signed out for should be kept at the minimum. On the other hand, checking in and out through the stockroom offers the best opportunity for keeping a continual watch on the condition of apparatus that is easily lost, broken, or mishandled. Laboratory instructors should be supervisors and consultants, and only to the minimum degree policemen, so the responsibility of keeping the apparatus in first-class condition rests on the storekeeper and the system he uses. Only definite experience in a particular laboratory will indicate what is safe to place out in the laboratory and what is more satisfactorily handled through the formal routine of withdrawal from a storage place, but the general rule should be that a student should go through such a routine for all apparatus that is easily and frequently broken or is of such a character that the student will handle and use it more carefully if he is made personally responsible for its safe return.

During the summer the contents of the cabinets in the storage rooms of the student laboratories are thoroughly checked to see that everything is in readiness for the following year. At this time major repairs are made in the instrument shop, and improvements to existing apparatus are tried out. Replacements and additions are ordered, and a year's supply of such items as coated paper rolls is bought. All this should be done, or at least well started, as early in the summer as possible, so that by the beginning of the fall term everything is ready for the year's routine to start functioning smoothly.

The Servicing of Graduate and Research Laboratories

Whereas undergraduate laboratory servicing responds to a definite routine, the servicing of research laboratories admits of very little planning ahead either in services or in the purchase of supplies and equipment. There must be, of course, certain long-range routine requirements: inventories should be made at least once a year to keep track of instruments; the condition of equipment must be checked frequently; supply reserves must be kept adequate, but waste must be avoided. As the writer sees it, the storekeeper and his program should function smoothly and silently as a background of continuous aid to the men actually at work on research projects. This means that the storekeeper and his system must be extremely flexible, so as to be able to respond promptly and effectively to every legitimate impromptu demand. It should be kept in mind by men servicing research laboratories that the very nature of scientific research precludes any detailed advance planning in regard to instrumental, supply, or informational needs. For that reason the research laboratory service man (call him storekeeper, curator, research assistant or what you will) should be agile enough to be able to turn from whatever he is doing and locate immediately a wanted instrument (or devise something that will do, at least temporarily, if such an instrument is not available), give accurate statements about the availability of unusual items of supply, or produce definite information and data about equipment and research technique.

The problem of instrument location and availability is best handled by some sort of perpetual inventory system. Here at Caltech this system is in two parts—the permanent inventory, and the running location inventory. The permanent inventory record, on a 3 x 5 card, is shown in Fig. 3a. This record is made out for every item of equipment, either purchased or constructed in the Institute shops, that cost $10 or over.

Apparatus No. BL 80002 Item PUMP, MEGAVAC
Case No. With MOTOR on base
From whom purchased American Electrical Sales
Address
Voucher No. 8855 G Date 4-27-39 Cost 99.50
Freight 6.20
Serial No. 549 Mfg. Catalog No.
Remarks Cenco Megavac
Pump numbered BL 80002A, motor BL 80002B
Motor data: Leland Electric Co., 1/2 HP
110/220 v., 60 cyc., 1 phase
1725 RPM
Ser. # 643EA840

CALIFORNIA INSTITUTE OF TECHNOLOGY INVENTORY CARD
PHYSICS DEPARTMENT
Form 2

Fig. 3a (right)—Permanent inventory record cards are made out in duplicate for all items of equipment that cost $10 or over

TRANSFORMER, Toy BL 8441
150 watts; 6 to 30 v. in 1 volt steps
With overload relay - Jefferson

NAME	LOANED	RETURNED
Robinson 19	5-15-38	10-4-38
[illegible]-24	10-4-38	3-5-39
106		
Robinson-19	4-10-39	5-28-39
Miller-052	5-28-39	1-14-40
106		
Fowler-Hi V.	2-4-40	

NORMAN BRIDGE LABORATORY OF PHYSICS

Fig. 3b (right)—One of these running location inventory record cards is made up for every piece of equipment that it is desirable to keep track of, even though small in cost

It is made up in duplicate, one copy being kept on file in the stockroom, and one copy being sent to the business office. The stockroom file is used mainly as the most convenient reference to previous equipment purchases; the business office file is used for accounting and insurance purposes. The running location inventory record, also on a 3 x 5 card, is shown in Fig. 3b. One of these cards is made up for every item listed in the permanent inventory record, and in addition for every other piece of equipment, even though small in cost, that it is desirable to keep track of. Small items of equipment that are to be built permanently into larger apparatus, or whose usefulness will probably have expired before they become available to a second user, need not have a location inventory card made. In general, however, in case of doubt the wiser choice is to make a record; useless cards that clog a file can always be removed later, whereas a record that is wanted and isn't there can be a source of annoyance and delay.

The permanent inventory record is kept in the stockroom, and is used almost exclusively by the storekeeper. The location inventory file is also kept in the stockroom; it is used by everyone on the research staff who may be concerned with the equipment listed. During the daytime the storekeeper himself usually arranges transfers of equipment and makes the entries on the cards; at other times those transferring equipment are expected to make the proper

Date	Number	Instrument	Borrowed By
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
4-9-39	BL 8637	McLeod	Jordan-2
~~7-7-39~~	~~BL 3206~~	~~Multimeter~~	~~Neher 50~~

Fig. 3c—Room cards supplement the location inventory cards

notations themselves. Supplementing the current information on the location inventory cards are the room cards (see Fig. 3c). One of these cards is thumbtacked to the inside of the door in each research room. Men borrowing equipment from a room are required to note the fact on that room's door card. Similar cards are hung in the apparatus cabinets in the student laboratories and in demonstration lecture storage cabinets. (Borrowing from demonstration lecture equipment should usually be discouraged, however; this discouragement can be made effective by having the lecture cabinets fitted with locks for which very few keys are issued.)

The instrument numbers shown following the "BL" on the cards in Fig. 3 are local equipment numbers assigned at the time permanent and location inventory cards are made up. Numbers beginning with 1 are assigned to undergraduate laboratory equipment, those beginning with 3 to the Electrical Measurements laboratory, those with 8 to general research equipment, etc. After assignment the number is stamped on the proper apparatus; inked rubber stamps, metal die stamps, and an electrically driven diamond-pointed etching tool are used for this purpose. The numbers are listed serially in a blank book, and opposite the number is written the inventory file description. This cross-index between number and descriptions should be kept up, for frequently it can be a valuable timesaver.

At least once a year a detailed room-to-room inventory should be made. This serves the primary purpose of keeping the location inventory record up to date. At the same time, this room-to-room inventory offers an excellent opportunity for checking the condition of apparatus in the room, for noting whether the apparatus is being used correctly, and for calling back to the stockroom equipment that is being used

so seldom that its continuous allocation to that room is not justified. This latter question is one that should be kept in the storekeeper's mind at all times. Probably no research laboratory is fortunate enough to possess sufficient equipment so that every worker can tie up in his own room every piece of apparatus that he might ever want to use. Yet that is what every worker would like to do. The writer believes this situation is best handled by the creation of a feeling of a gentle and friendly tug-of-war between the storekeeper and the research man, with the purpose, not of having the storekeeper win the tug-of-war, but of keeping the research worker reminded that apparatus he is not using fairly often should be made available to others. It should not be misunderstood that the writer advocates a full instrument stockroom. Apparatus sitting idle on storage shelves never performed any useful research service; the equipment inventory should be kept down to a reasonably useful figure, and then such useful apparatus be made freely available to those who can use it to advantage.

At the time of the room-to-room inventory, and at frequent additional visits throughout the year, the storekeeper should keep his eyes wide open in regard to other things besides apparatus location. He should check the oil level in vacuum pumps and notice by the sound of the pump and the condition of the oil whether the pump should be brought in to the stockroom for cleaning and overhaul; he should check the grease-cups on motors and other lubricated apparatus; he should check the expiration dates of boxes of photographic plates, so that if the plates are getting old they can be distributed around to other users and so get put into service more quickly. He should discourage the accumulation of unused supplies. For example, a bread-board lamp bank may be stacked in the corner, its usefulness over so far as that room is concerned; the room occupant should be requested to break it up and return the lamps and sockets to the supply drawers in the stockroom. The suggestions given above are but a few of the many that will occur to any storekeeper who is wide-awake and interested in keeping the research rooms and the laboratory equipment and supplies in as efficient and useful a condition as possible. Some readers may object and say that the research men themselves should take the responsibility for these things; the answer is a practical one—they don't. They will cooperate with the storekeeper generously, but their interest does not lie in laboratory housekeeping, and they will not take the initiative in regard to the type of thing discussed in this paragraph.

In addition to making equipment easily available, the laboratory service man may expect to be asked questions ranging from the best way to aluminize an interferometer mirror to how quickly can a pure zinc cylinder be obtained. It is in this capacity as a convenient abridgement of a material and technique encyclopedia that the service man is most valuable to the research department of a school. It should be his duty to look carefully through every catalog that comes in, noting particularly new materials and new applications of old. As part of his monthly routine, he should go over the journals, such as *Review of Scientific Instruments, Journal of Applied Physics,* etc., not neglecting the advertisements. Whether or not he has the time or inclination to read the type of article appearing in journals like the *Physical Review,* he should at least check these articles monthly for their discussions of research arrangements. Finally, he should make it an integral part of his job to become familiar with the research arrangements and research problems in each room in his jurisdiction. The main results achieved in that room will become available through publication, but each room and each research worker will have some unpublished history of minor and incidental problems solved. A knowledge of these minor solutions and improvements should be passed along to other research workers in the laboratory—the person in the best position to spread this knowledge is a competent and interested laboratory service man.

The Operation of the Physics Stockroom

The first comment to be made under this heading is to recommend the reading of Mr. Foulk's excellent article in the eleventh edition of THE AMERICAN SCHOOL AND UNIVERSITY, pp. 465-479. Although Mr. Foulk discusses the arrangement and record keeping of a chemical stockroom, his thorough and detailed picture can be adapted with little modification to a physics stockroom. For that reason no time will be spent here in discussing catalog files or records.

The physics stockroom does not usually require the continued presence of a full-time attendant, for its delivery counter will be active only at four brief periods in the day: at the beginning of the morning and afternoon laboratory sessions, when undergraduates are withdrawing supplies for their experiments, and at the corresponding close of the sessions when these supplies are being returned. During the rest of the day the stockroom visitor can be taken care of by some such means as a call bell for the storekeeper or by having some service worker nearby. This problem is solved at the California Institute by combining the stockroom and the departmental office, so that the departmental secretary is available during the day; during the four busy periods the storekeeper stays in the stockroom.

All the thousand-and-one items of expendable supplies that are needed in a laboratory are kept in the

stockroom. Caltech staff members and other research workers are not required to take delivery of these items over the delivery counter, but are privileged to go behind the counter and help themselves. For their convenience in obtaining what they need, supplies are kept in small drawers and open bins. These drawers and bins are labeled and numbered; hanging nearby is a location index book listing every item carried and its drawer or bin location. The labels are large enough and the supply locations grouped so obviously by classifications that a new arrival will need to refer to the index only once or twice before he becomes familiar with locations.

The drawers and bins contain only a small supply of their particular item. The continuous wastage of supplies can run into a large amount in a year, and it has been found by experience that if drawers and bins are generously filled, wastage inevitably occurs. If a research man needing two of something comes to a bin and finds a dozen there, he will take three, "just in case"; if he finds only four there, he will take only the two he actually needs. For this reason only small amounts of supplies are put out; the main reserve stock is kept in locked storage cupboards elsewhere in the stockroom. Of course such a system requires that the open storage places be checked regularly, but the additional labor involved in the frequent refilling is more than offset by the saving made through the elimination of waste. Certain key staff members have keys to these storage cupboards, so that in the absence of the storekeeper any legitimate large need can be satisfied from the reserve stocks by appealing to one of these staff members.

Next to the main stockroom, opening from it, is a small chemical stockroom. Here are kept a small supply of chemicals, cans of solvents, a small supply of laboratory glassware. There is a workbench with sink, a fume hood, another workbench with a pan balance. Photographic solutions for use in the various laboratories and dark-rooms are made up here. Along one wall is equipment for cleaning and distilling mercury. No attempt is made to keep a complete stock of possibly useful chemicals in this room. Items used frequently are here, but for non-standard items dependence is placed on the chemistry stockroom in the nearby chemistry building.

Across the main corridor from the stockroom is the instrument room. This room, which serves as the storekeeper's office, also contains storage shelves for instruments and equipment, a repair bench, and a testing and calibrating table. It is kept locked when the storekeeper is not in; only permanent staff members have pass keys. Equipment brought back from the laboratories is inspected before being placed on the shelves available for withdrawal again. Minor repairs are made immediately; apparatus requiring major repairs is taken to the instrument shop; the calibration of meters is checked. Also in this room are kept certain items of expendable supplies whose consumption the storekeeper has found it desirable to watch closely.

In any school with other departments containing laboratories and research facilities, the physics stockroom should not be an isolated unit responsible only to its own department. Much greater over-all campus economy and efficiency can be obtained by teamwork between the various departmental stockrooms. If there is a central purchasing department, that department should see to it that such teamwork does prevail; in the final analysis, however, the effectiveness of the teamwork will depend upon the amount of contact and cooperation between the departmental storekeepers. Here at the Institute that cooperation exists to a very satisfactory degree. Storekeepers exchange lists of materials they may have that are unusual or difficult to obtain. Instead of attempting to purchase and carry a complete stock of everything that might be wanted, on particular items where their stock needs are small they purchase through, or draw from, the stockroom that is buying that item in large quantities. The physics stockroom, for instance, does not need much chemical glassware in the course of a year; instead of buying glassware directly at high unit prices, the physics storekeeper obtains his glassware from the chemistry stockroom at bulk case prices. Dozens of items to be affected by such intramural trading will occur to anyone interested in the problem. The point to be made here is that such mutual cooperation and interdependence will bring the overall campus inventory down and purchase discounts up.

A SCIENCE BUILDING FOR A TEACHERS COLLEGE

By ZED H. BURNS

Associate Professor of Education, Appalachian State Teachers College

THE purpose of this article is to help those responsible for the erection of new college buildings to get a clearer idea of the functions of the various individuals involved in the building of a science building for college work, and also to present a clear picture of the various steps which such a task demands. It is not the purpose to go into institutional need for additional floor space, nor the matter of financing the project. It is assumed that the need for added floor space is genuine and that the funds for the new science building are in hand.

The question, therefore, is: Now that we have the money, how shall we set about the job of getting the most for our money in this project?

The Educational Specifications

The demands of the situation educationally, constitute the educational specifications for the building.[1] These should be as detailed and definite as it is possible to make them. There is usually only one place from which these educational specifications can come; that is, the department, or departments, which are to be housed in the new building. The number of classrooms or laboratories required and the approximate number of students each must accommodate is all right as a starting point, but no more than that. There is no reason why each person who is to carry on instructional work in the new building should not prepare a detailed account of the nature of his work, his schedule, and his needs as to office space. He should present clearly any peculiarities of equipment which his work involves and how this equipment should, in his opinion, be housed. Practical considerations of cost may make it necessary to eliminate some requests, but in the beginning of handling the problem these requests should be definitely considered.

As a brief illustration of how educational planning affects the actual construction of a college science building, let us take the following. There are, in general, three well-established methods of college teaching:

1. The lecture method, where students are brought together in large groups varying in size from 50, or 60, to 100, 200, or 300 individuals.

[1] For an excellent and detailed discussion of this matter, see "College and University Administration," by Lindsay and Holland, p. 162.

2. The recitation method, where student groups will average approximately 30 or 35 individuals.

3. The laboratory method, where groups will seldom run higher than 30 in number and are often much smaller.

It is evident that the person who is going to design the college building must know in advance what the policy of the college is with respect to its plan of teaching. The need for detailed and exact knowledge of just what work is to be done in the new science building cannot be over-emphasized as the first consideration in the planning of the building. Advice on this score may often be had from other colleges where satisfactory work is being done, or from educational experts attached to the larger universities.

Selecting an Architect [2]

By far the most common method of securing the services of an architect is by the job for a specified fee, almost always a percentage of the cost of the building. Most architects who would be desirable as architects on a college or university science building are either members of the American Institute of Architects, or abide by its rules with respect to the matter of fees. The most usual fee is 6 per cent of the cost of the building. An architect is paid not only for the production of drawings and for supervision of construction, but primarily for his expert knowledge of design and construction. It is difficult for the layman to judge this quality in an architect. His best insurance against hiring the wrong man is to demand that the architect shall have designed a similar building in the not too distant past, which is at present satisfactory to those using it. The college executive who does this protects himself in large measure, for there still exist those individuals in the architectural field who have apparently all the credentials but whose work is an abomination to the land. A good architect will have many things in mind in the design and construction of a college science building besides the use to which the building is to be put; general appearance, proportion, and the relationship to existing buildings for example, but the test of his ability and qualification to design college buildings will depend upon how well the science building fits the uses for which it is intended.

In the preparation of plans and specifications to meet educational requirements of the building the architect will have to work with the heads of the departments which are to occupy the building. Before the plans for the building are finally accepted, they should be gone over very carefully by the head of each department concerned and his staff. The plans should be checked at this point for the relationship of classrooms and laboratories, stock- and storage-rooms, office space, and all other pertinent details. Any changes which are desired should be asked for at this point. The importance of this can hardly be over-stressed. Nothing is so annoying to architect and contractor alike as a departure from the drawings as finally approved. After final approval is given, only the utmost necessity should justify any change.

Before final approval is given the architect's plans and specifications, they should be checked by some educational expert to see that the minimum essentials of good college building design have been met. These are, in the main, lighting, both natural and artificial, heating and ventilation, and the distribution of space within the building. Standards for the first item have been set forth by the Illuminating Engineering Society in cooperation with the American Institute of Architects in a small bulletin approved by the American Standards Association February, 1938. Heating in the modern college building is by steam from a central power plant. Ventilation has been argued pro and con innumerable times, but the simple system of individual room ventilation by window has been found from experience to be the most satisfactory. The following table [3] suggests the amount of space which

DIVISION OF SPACE IN EDUCATIONAL BUILDINGS

	Per Cent
Instruction	50
Stairs and corridors	20
Administration (offices)	16
Walls and partitions	10
Flues	3
Accessories	1

might be properly devoted to different services. It can be said, however, that in general the greater the amount of space devoted to instructional purposes, the more efficient the building. There is some question as to whether professional offices and laboratory stock and storage rooms should be counted as space devoted to instructional services. Since both of these do contribute rather directly to instructional efficiency, their inclusion under the item Instruction seems justified.

The New Science Building at Appalachian State Teachers College

The need for a building to house the various departments of science was apparent to the administration and others at Appalachian State Teachers College for a long time. The educational planning of such a building goes back almost a decade. First of the many who have had some share, large or small, in the conception of such a building is the present President of the College, Dr. B. B. Dougherty, who has for

[2] Lindsay and Holland in the source already cited give an enlightening discussion of this problem, p. 163-69.

[3] Taken from Lindsay and Holland, op. cit. p. 170.

years gathered ideas for such a building from department heads, both on his own campus and on those of many other colleges. In the summer of 1938 the state appropriated funds for such a building, and still further aid was secured from the Public Works Administration. After much consultation on the educational needs of the various science departments, an architect was called in to design the building. The needs for a new building for the science departments at Appalachian State were fairly typical of the needs of colleges in general for buildings for this purpose. In the first place, a central location was highly desirable to enable students to travel to and from such a building with respect to other points on the campus in the small time allowed for this purpose. Mainly for this reason a site was chosen only a short distance from the Administration Building, which is the main classroom building, and also near the Library. The building was planned to house the Biology Department, the Chemistry Department, and the Physics Department.

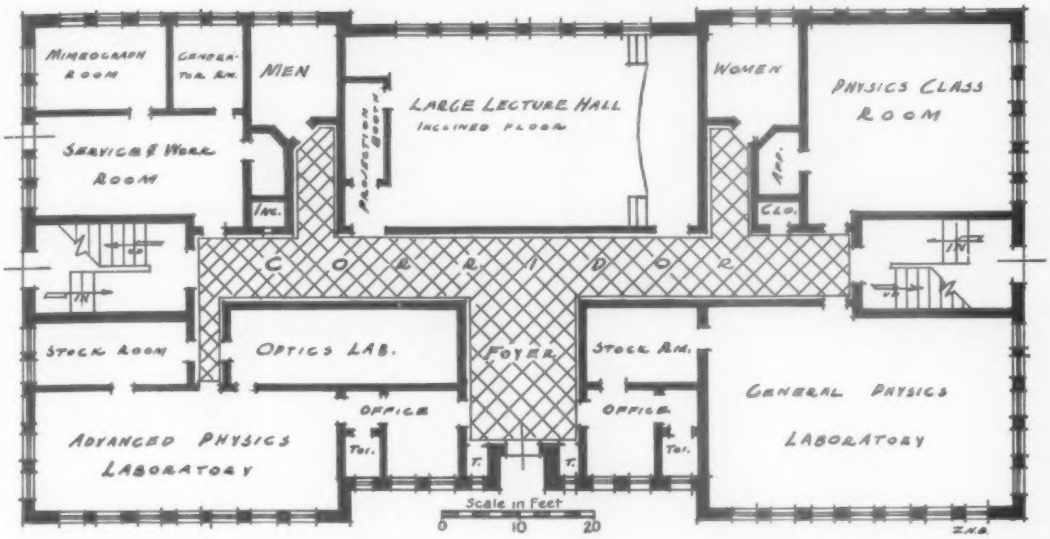
The newly completed science building at Appalachian State is of modified Georgian design, the modification showing itself in the character of moldings, belt course, and general details. This choice of style enabled the building to fit in with the best of the buildings already on the campus, and yet to maintain some individuality. It is somewhat rectangular, about 132 feet by 67 feet, and measures about 50 feet to the ridge of the roof from the ground. One of its most important features is the complete lack of combustible materials in any of the structural parts. With the exception of doors, cabinets, shelving, and other furniture, there is no wood in the building. The general exterior finish is hard shale common brick in varying color range, laid in Flemish bond with flush 3/8-inch joints. The foundation, where exposed, is of concrete in a rubbed finish. The center part of the first story façade is faced with cut Indiana limestone, the belt course at the second-story window-sill height is of this material, and so are the corner quoins, which have a brick course between them. The first- and second-story windows have jack arches over them. There are two gables on the front and two on the rear, each with a round opening containing louvers. Almost the only attempt at ornamentation on the whole building is the one word SCIENCE flanked on each side by three medalions, each symbolic of some division of science. On the inside of the front vestibule are incised the names of some of the world's greatest men of science. There are three entrances, one front and two end. The two end ones are in fire towers. All windows are of steel and are double-hung. The roof is supported by a framework of structural steel, supported in turn by concrete beams, exterior and corridor walls. To the structural steel of the roof are fastened steel roof rafters which carry steel mesh over which was poured a mixture of nailing concrete. Over this was laid 30-pound felt, and 278-pound asbestos shingles 5 inches to the weather. All sheet-metal work is of copper.

All interior partitions, with the exception of the corridor and fire towers, are non-load-bearing. The floor system is of reinforced concrete joist with permanent pans. Public toilet rooms have a 6-foot tile wainscot and a tile floor with drains. All structural steel, except roof and lintels, is encased in concrete. All interior walls are of cinder-concrete block painted with casein paint in a light cream color. Ceilings are of common plaster on metal lath, finished white coat and smooth. All interior door bucks are steel; interior doors are white pine, flush construction. The five classrooms, the six offices, and the space intended for lounge and library, are all floored with asphalt tile laid over concrete. The other floors throughout the building are simply smooth cement concrete finished with a medium shade of green metallic hardener, except in the case of the first-floor corridor, which is terrazzo.

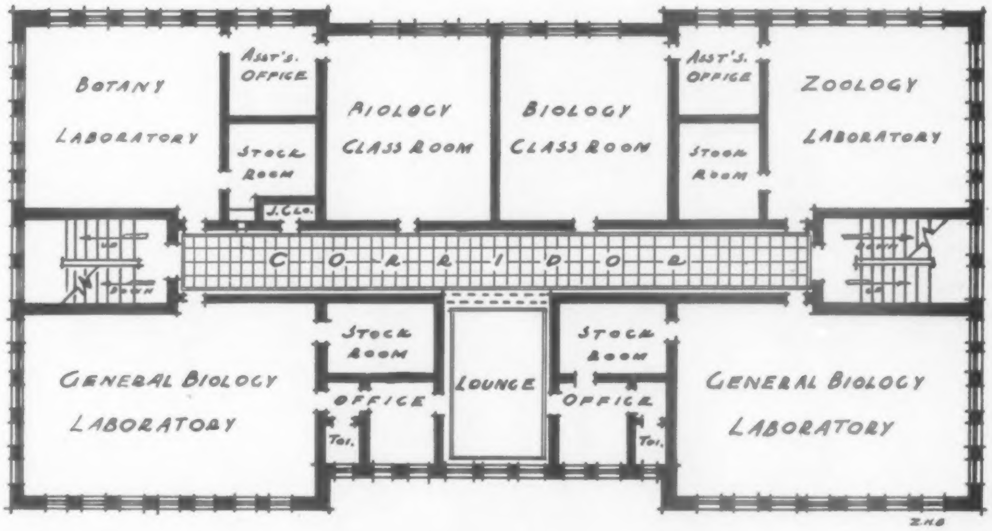
This building is three-story and without a basement. On the first floor is the Physics Department of the College. The space for this includes one classroom (all classrooms seat 36 students) with a small apparatus storage- and stock-room adjoining, one large laboratory for general work with a large stock-room in connection, two offices, each with private toilet and lavatory, one laboratory for advanced work with a larger stock-room having outside light, and an optics laboratory with mechanical ventilation. In addition to the Physics Department on this floor, there is a large lecture room for the use of all departments. This room has an inclined floor and a seating capacity of 88 students. The seats are opera type, but have tablet arms which can be swung down out of the way. The incinerator is on this floor, as are also the following: toilets for men and women; good-sized service room to serve as workshop; mimeograph room; generator room; telephone booths; and janitor closet.

The entire second floor and part of the third are taken up by the Biology Department. This department has three classrooms, two on the second floor and one on the third. There are two large general laboratories, each with a large stock-room and an office, including toilet. There is a student lounge on the front of the second floor. On the same floor are smaller advanced laboratories, one for botany and one for zoology. Each of these has a good-sized stock-room, and space to serve as an assistant's office or an added storage room. This floor has access to the incinerator and a janitor's closet.

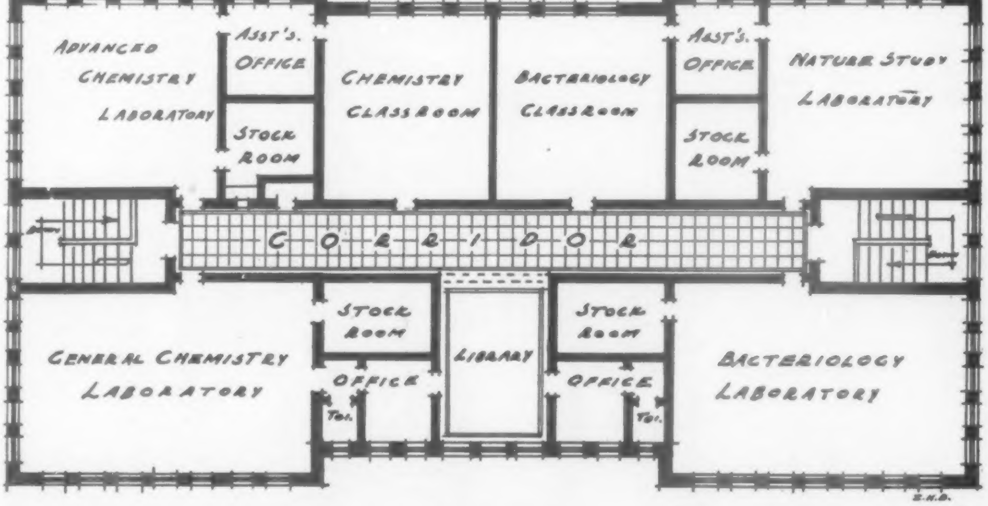
On the third floor, besides the biology classroom,



First Floor



Second Floor



Third Floor

is a large bacteriology laboratory and stock-room, and another office. There is also a small advanced laboratory complete with stock-room and assistant's office, which probably will be used for nature study. The Chemistry Department is also on this floor. This department consists of one classroom, a large general laboratory with stock-room and office adjoining, and a smaller advanced laboratory with stock-room and assistant's office adjoining. This floor also has a janitor's closet and access to the incinerator and library space.

A number of the special features of the building may be credited to Appalachian State's Professor of Physics, Antonios Antonakos. Professor Antonakos has had many years of experience in the design and construction of stage sets, and through this experience he has come to know the value of simplicity in construction. He was largely responsible for incorporating into the building such ideas as the following: overhead rods attached to the ceiling over the platform and along one side of the large lecture room, for suspending charts, projection screen, or other items; instructor's movable table with services in a recessed floor box and connections by means of hose and detachable wire; a direct-current distribution panel with a complete circuit to each physics and instructor's table, so that an experiment conducted at one table does not affect the potential at any other table. The building also has green glass chalk-boards, and the furniture for the three departments is finished in a different color for each department. It might be well to turn back at this point to the distribution of space in the building to see how well the building meets the criteria of educational planning already given.

Under the first floor there is a steam tunnel containing an area of 1,008 square feet. The gross area of each floor is 8,589 square feet; a total area in all three floors of 25,767 square feet available for the planning of the building. Of this area, the various divisions are shown below:

DIVISION OF SPACE IN COLLEGE SCIENCE BUILDING

	Square Feet	Per Cent
5 classrooms	4,195	16¼
11 laboratories	8,974	35
6 offices	786	3
Stock-rooms, and assistant's offices	1,082	4¼
Walls and partitions	4,641	18
Stairs	1,260	5
Corridors, including lounge and library space	3,548	13¾
Service rooms, janitor's closets, incinerator, mimeograph, etc.	819	3
Toilets	462	1¾

If only the space devoted to classrooms and laboratories is admitted under the heading Instruction, then the building does little more than meet the minimum requirements as set up. However, if as has been suggested, the space devoted to offices, assistant's offices, and stock-rooms be classed as space for instructional purposes or contributing to such purposes, then it may be considered that 58½ per cent of the total area available is used either directly or indirectly for instruction. It may be noted that the space occupied by walls and partitions runs rather high—18 per cent, rather than the 10 per cent allotted to this item. This is largely brought about by the many stock-rooms and service rooms called for by the specialized nature of the building. There is no implication that this building can serve as a model for other science buildings, but it is believed definitely that the building as it stands does fit into the instructional program of this college in a very satisfactory manner. In the construction of this building, cost was a great consideration. Nevertheless, cost was not permitted to outweigh the consideration of making the building as useful and as permanent as possible. Actually, the cost per cubic foot, which was 28 cents based on the general contract, exceeds slightly the average cost of school buildings in general, as based upon a recent study [4] which was 24.4 cents for general construction when built under PWA. When the heating and plumbing and equipment contracts are added, the per-cubic-foot cost is raised to 36.9 cents. Considering the specialized nature of the building and the fact that the comparison is with non-college buildings, no apologies are offered on this score.

The equipment for the building was not bought as stock items of the conventional paneled type in the usual oak finish. Every item of equipment was especially designed for the purpose for which it was to be used. It was possible, however, to set certain sizes as standard so that the cost of cutting the stock for its construction was greatly lessened. This equipment is constructed of plywood, the cases of ½-inch 5 ply, and ⅞-inch 7 ply, with the outside layer of Grade A hard mountain birch. All table tops except those on the chemistry tables were constructed of 1⅝-inch birch and specially treated to make them waterproof and chemical-proof.

This equipment was designed in a modern style with very few dust-catching projections. Even the laboratory tables and wall tables have a very small overhang, in order to streamline them somewhat. The classroom chairs are of plywood in the latest university style, having steel pedestals fastened into the floor with four bolts. This type of chair helps to prevent noise, gives a neat appearance to the room, and facili-

[4] "School Building Costs," by N. L. Engelhardt, Jr. Bureau of Publications, Teachers College, Columbia University, New York. 1939.

Botany Laboratory, showing large flat surfaces of special tables. Auxiliary table in foreground. Finish, silver gray

Physics General Laboratory — Tables have small sinks, hot and cold water, and sockets for uprights and cross-bars. Finish, dark green

tates sweeping and cleaning. The biology equipment and the classroom equipment are finished in silver gray, the laboratory equipment for physics is finished in green, and the chemistry equipment in dark-red mahogany. All trim is chromium or aluminum. The physics tables and the instructors' desks have hot and cold water, gas, and air, and direct and alternating current. All other laboratory tables have the same services without the air and direct current; however, each laboratory has air and direct current available at some point, usually a wall table. The tops of chemistry tables and all sinks except those in the optics laboratory are of alberene stone; the optics laboratory sinks are of earthenware.

In the design and construction of a building as extensive as this one, the question generally arises at the close of the project: "What changes would you recommend, if you were starting over?" There are some. By the use of chases it would seem possible to increase the accessibility of all pipes and wiring. A somewhat simpler type of stair balustrade would seem desirable. All laboratory floors could be terrazzo, and all other floors concrete covered with asphalt tile.

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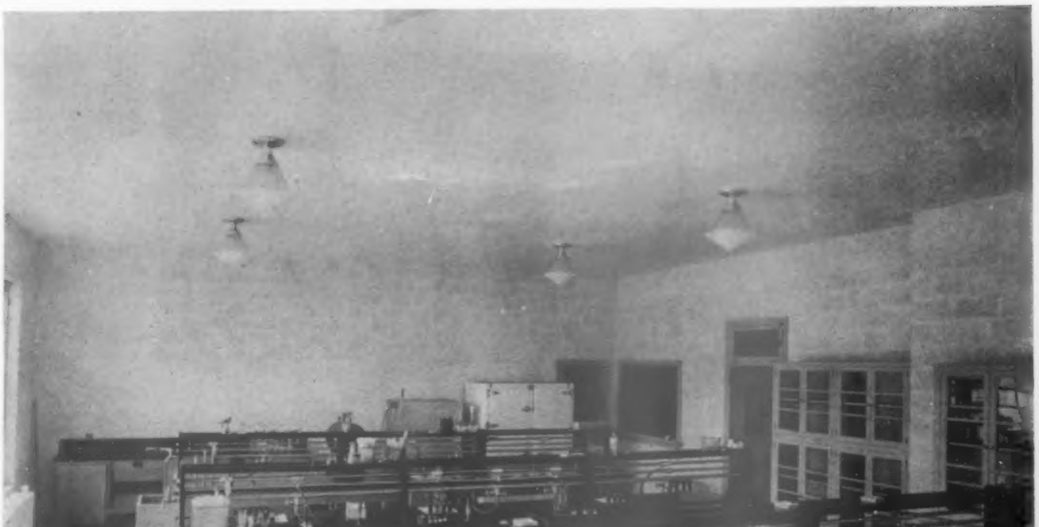
Physics Classroom, showing asphalt tile floor and pedestal-base chairs. Finish, silver gray

Chemistry General Laboratory — Fume hood in corner. Instructor's office through door. Finish, dark-red mahogany



Bacteriology Laboratory—Work tables similar to chemistry benches. The small sinks have a wood base. Finish, silver gray

SURVEY OF THE BUCKNELL UNIVERSITY CHEMISTRY DEPARTMENT

By BRUCE J. MILLER, Head, Physics Department, and HAROLD KERSTETTER, '41
Bucknell University

THE small college Chemistry Department, with its limited budget, must constantly be on the alert to devise new and yet economical methods to maintain its efficiency. Bucknell University is especially typical in this respect. From a student body of about 1,300 undergraduates, almost 325 are enrolled in one or more of the four divisions offered in Chemistry: Inorganic, Analytical, Physical, and Organic.

The Chemistry Laboratory was erected in 1890 and enlarged one-third in 1921. Within the last year, extensive renovations have greatly increased the facilities of the department, so that there are now 10,000 square feet of utilizable laboratory floor space in the four-story building.

New Shop Has Adequate Facilities

Recent improvements of the physical facilities of the Chemistry Department have been due largely to the development of its shop facilities. In its early history, the department followed the policy of purchasing all laboratory equipment, for both elementary and advanced courses, from standard supply houses. When a part of the more complicated glass equipment was broken, it was discarded and replaced. The maintenance of such staples as ringstands, rings, clamps, and tripods was haphazard and it was found that the average life of the apparatus was unduly short.

In 1935, the so-called shop contained only a workbench with a vise and a few hand tools and wrenches. During this era, the students' experimental results in Physical Chemistry, in particular, were unsatisfactory and excessive errors were the rule rather than the exception. The department then decided that the only way to obtain satisfactory results was to build the best type of equipment and construct permanent mountings for the Physical Chemistry experiments.

One of the first real needs was a thermostat for work in conductivity experiments and in electrochemistry. An old water bath was utilized, the mercury thermo-regulator was fashioned, and a tap and die set was borrowed for the adjusting screw head. In order to build even this thermostat, much time was wasted, and work on the metal lathe and drill press was done by another department.

There are 10,000 square feet of utilizable laboratory floor space in the four-story building used by the Department of Chemistry at Bucknell University

The new shop is only 20 x 15 feet, with an adjacent tool room 7 x 14 feet

Some time later, after the reorganization of the Chemical Engineering Department, the chemical engineers, then located in the Chemistry Building, equipped a small shop which they graciously permitted the Chemistry Department to use. The shop contained a metal lathe, a drill press, a work-bench with a vise and pipe vise, and had a satisfactory supply of bolts, nuts, machine screws, stock brass and other metals.

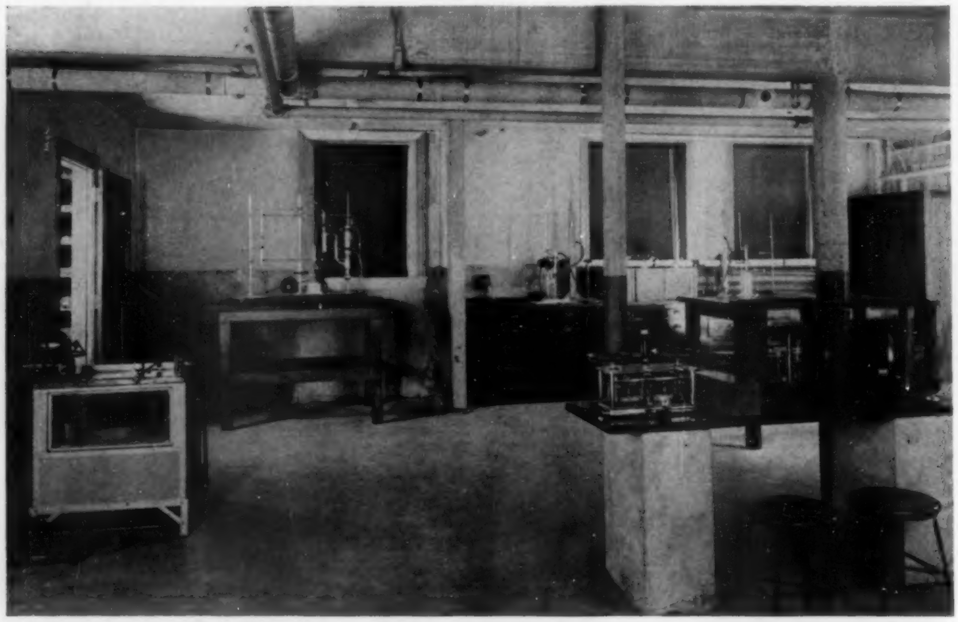
By using this shop, the Chemistry Department found it possible to construct a large share of equipment for the laboratories. Permanent mountings were built for the modified-Victor Meyer apparatus, for an effusion outfit, for potentiometric titrations, and for many other Physical Chemistry set-ups. The most important project completed at this time was a complete Warburg-Barcroft manometer outfit.

With the completion of a new Engineering Building this summer and the subsequent removal of the engineers to their new quarters, the Chemistry Department was faced with the prospect of losing its shop facilities. This was especially unfortunate in view of the fact that many of the rooms vacated would have to be altered in order to adapt them to the needs of the department. Since renovations had to be completed by the fall term, the Chemistry Department purchased tools and equipment that exceeded even the shop facilities previously provided.

The new shop is only 20 x 15 feet, with an adjacent tool room 7 x 14 feet housing a metal lathe and containing all the smaller tools and materials filed in cabinets. The metal lathe was left in the transfer of the Chemical Engineering Department, and is indispensable for repair and construction work. The wood lathe is yet an unknown quantity. It was acquired for only \$25 and has been chiefly used for sanding, although some bases and standards have been turned.

The most useful piece of equipment in the shop is the heavy-duty bench type drill press. A complete set of high-speed drills was purchased with the press. At the present time, workers are making two types of test-tube racks for Semi-Micro Analysis and for Organic Chemistry. They are also equipping the laboratories with "spill-proof" reagent racks—desk-length blocks of wood drilled to insure a close fit for the bottles. Mortise chisels and mortising attachments for the drill press guarantee clean accurate mortise and tenon joints on such projects as tables, bookcases and cabinets.

The portable tilting arbor saw with texrope guide and mitre gage is especially necessary in making room alterations. For this work, requiring ripping and crosscutting of heavy stock, the department found that a 1-hp motor was more satisfactory than the $\frac{3}{4}$-hp motor usually recommended. The department also discovered that with this equipment a line current of more than 30 amperes is desirable. Various kinds of 10-inch saw blades were tried, and the most useful was found to be the combination crosscut and rip type. It gives smoother rips and saves time and trouble incurred in changing the blades. Then, too, an abrasive cut-off wheel was acquired for this



The new physical chemistry laboratory is located on the ground floor

blade to facilitate the cutting of ferrous and nonferrous metals, and short sections of glass tubing.

This major equipment, including motors, cost approximately $400. This includes, in addition to the equipment mentioned before, a set of two carborundum wheels used to sharpen the various tools, and an adequate supply of smaller tools which were added as the need arose.

Project students, N.Y.A. workers, and departmental employees, work under the supervision of the curator or members of the department. After the "build-it-yourself" plan is in operation for a short time, the economies realized enable the department to support many of its own projects.

Physical Chemistry in New Quarters

When the Chemical Engineering Department vacated the basement floor, the Chemistry Department discussed the desirability of having the Physical Chemistry laboratory located on the ground floor near the shop.

With the use of the equipment in the shop, departmental workers were soon able to renovate a room 32 x 27 feet. In the center of the room, far from any acid dispensers, four concrete pillars were set into the ground by the Department of Buildings and Grounds to provide a non-vibrational base for the alberene stone slabs upon which a torsion balance and four analytical balances are set.

It has been the experience of the department that it is desirable to plan plumbing fixtures so that any changes and repairs necessitated may be made without unduly disturbing the desks and the equipment. The plumbing system, also installed by the Department of Buildings and Grounds, included outlets for water, air, gas and steam, and was first installed as units separate from the desks. The outlets, as well as those for a-c and d-c current, are located above the desks. Thus the desks can easily be withdrawn from the walls in units, and repairs made conveniently and without damage to the equipment.

The desks were not purchased from a supply house; instead, a great saving was effected by reconditioning old units in the shop. A search of some of the almost-forgotten sections of the fourth floor revealed valuable accumulations of the years—discarded laboratory desks and slabs of alberene stone. The desks were torn apart, brought down to the shop, cut to size on the arbor saw, and drilled preparatory to the installation. Each desk was then individually fashioned to the unit. The alberene stone surface was treated with a mixture of the following proportions: 1 pint linseed oil, 1 pint kerosene, ½-¾-pound paraffin wax, and lampblack to suit. The stone was first scrubbed with soap and hot water, scraped, and the mixture applied. After drying for several weeks, the desks were again coated with the clear mixture, omitting the lampblack. Finally the surface was polished with a buffing wheel attached to a flexible shaft.

An adjacent stock room 13 x 15 feet serves as a storeroom for Physical Chemistry equipment and also as the glass-blowing laboratory. Under the tutelage of the faculty, adept students are taught to build apparatus with the usual tools useful to this art. Not only do these students gain valuable experience, but some also develop enough skill to be of considerable value to the department. In the past, routine and special laboratory equipment such as condensers,

adapters, distilling and fractionating columns, and thistle tubes, have been built by student glass blowers to the complete satisfaction of the department. All the complicated glass apparatus for Physical Chemistry is built in the glass-blowing laboratory and mounted into a compact unit in the shop. In the background of the picture can be seen such a piece of apparatus—a high-vacuum line which has been fashioned by a student in the laboratory and mounted in the shop.

Reading Room Proves Popular

By far the most popular innovation was the construction of a reading room and lounge for upperclass chemistry students.

A well-lighted corner of an old laboratory was walled off into a room 19 x 14 feet. With only a small expenditure of money for paint, departmental workers painted, paneled the boarded wall, and installed a blackboard at one end of the room (not shown in the picture). Standard equipment was purchased—a large library-size table, two desk lamps, eight regular chairs, and three leather easy chairs.

Students have access to current chemistry periodicals circulated through this room for a month after issue, after which they are sent to the college library, where they are bound and filed for future reference. It was the hope of the department that this room would inspire upperclassmen and graduate students to do more extra-curricular reading in the field of chemistry, and indications are that this hope has been realized. The blackboard also facilitates the use of the room for small classes and seminar groups.

Curator a Busy Man

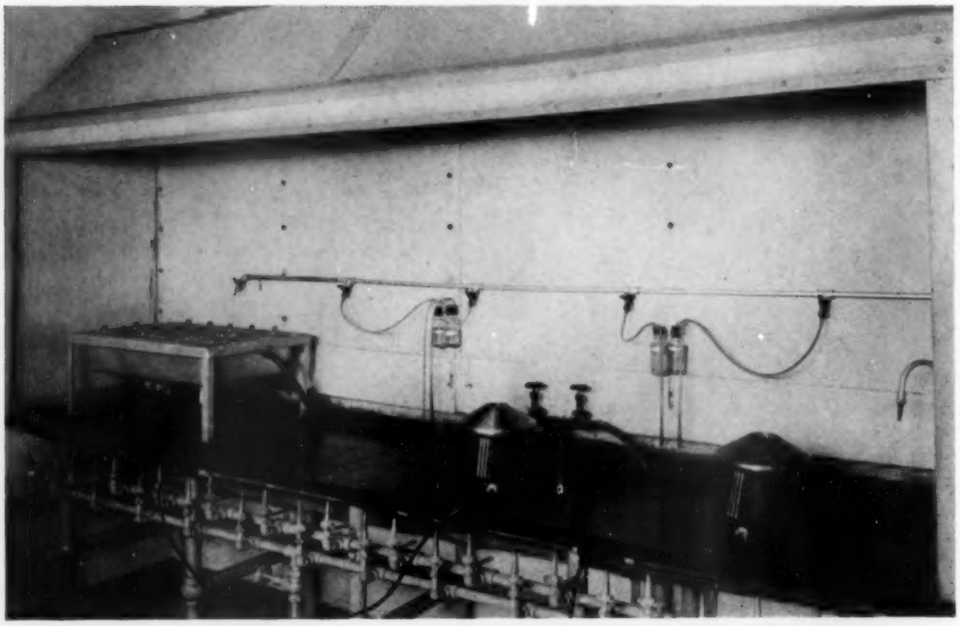
It is financially difficult for a small college to maintain a full-time stock-room man. This problem may be solved by the employment of a practical man who works in the shop when he is not busy elsewhere. A ring of the bell in the nearby stock-room, and he returns to his primary job.

At Bucknell, the curator is a busy man. His is the quadruple task of keeping an inventory of the stock, issuing apparatus and chemicals not kept in the various laboratories, supervising work in the reconditioning room, and planning work in the shop.

The department feels that the curator effectively accomplishes these multiple duties and therefore justifies his existence. In the construction of a reconditioning room for metalware, he illustrated the use of the drill press and other machines in the installation of the battery of three cylindrical vats and the lead drainboard. The inspiration and model for this room was an article by W. B. Foulk that appeared in the 1937 issue of THE AMERICAN SCHOOL AND UNIVERSITY.

In the shop, the curator is adept at using most of the machines and, with N.Y.A. students to help him,

A well-lighted corner of an old laboratory was walled off to provide a space 19 x 14 feet, to serve as a reading and seminar room



An open-front fume hood, similar to the one shown, is now under construction in the shop

he does much of the work planned by the department.

At the present time, workers are constructing a fume hood similar to the one shown in the picture. This is the open-front type, 10 feet long, 28 inches deep, with a clear opening on front 36 inches high, and with a front and back baffle plate. The inside height is 46 inches, and an alberene stone slab serves as the floor of the hood. Quarter-inch Transite board was ordered to size and joined by angle-irons which were cut and drilled in the shop. Hoods are operated on a central fan system with shut-off and switch controls near each hood.

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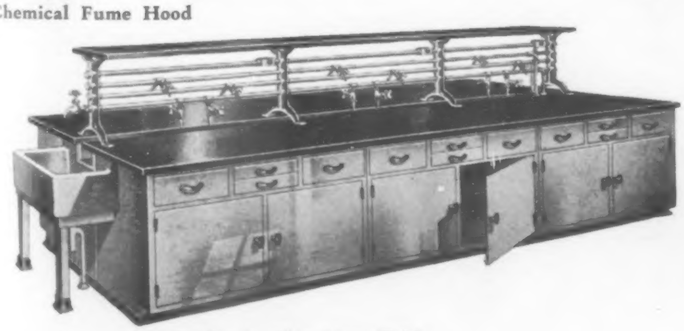
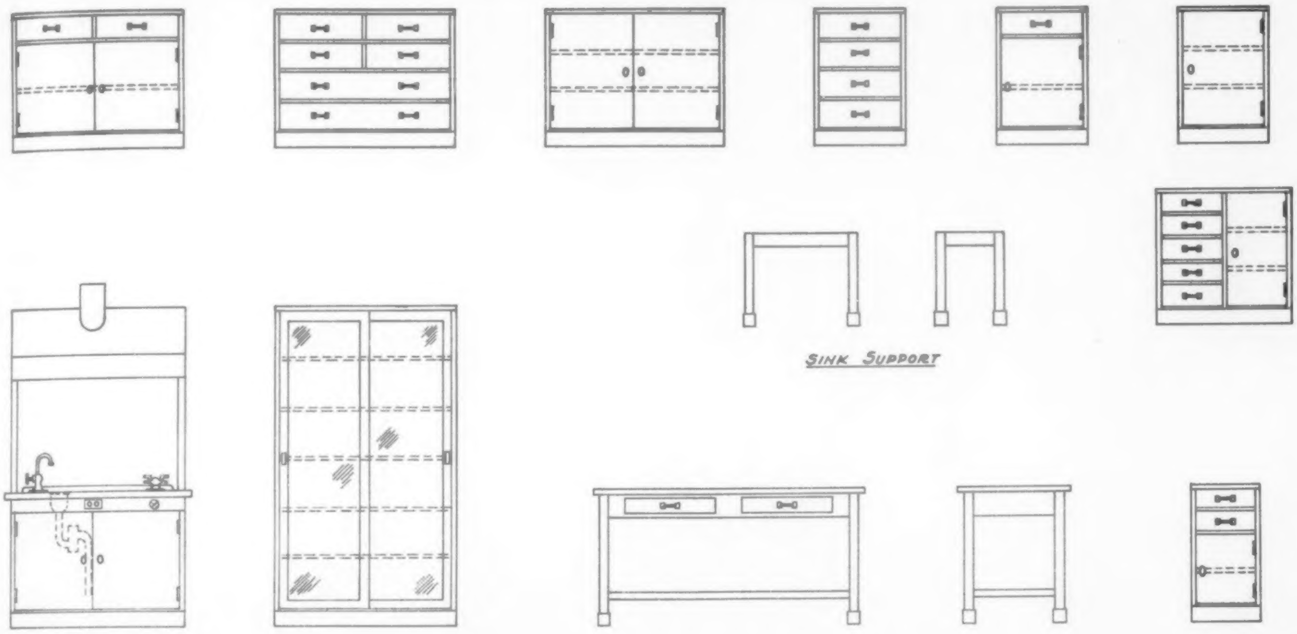
LABORATORY FURNITURE CO., INC.
Northern Blvd. & 39th Street
Long Island City, N. Y.


Student's Chemistry Table


Instructor's Table



TYPICAL LABORATORY UNITS

Research Laboratory, Aluminum Co. of America

Biological Laboratory, Ursinus College

Princeton University

Temple University

Temple University

ALBERENE STONE CORPORATION OF VIRGINIA

Quarriers and Fabricators of Alberene Soapstone

Virginia Alberene Stone, Black Serpentine and Tremolite Green

419 Fourth Avenue, New York, N. Y.

Quarries and Mills at Schuyler, Va.

BRANCHES

Atlanta, Ga.	Cleveland, Ohio	New Orleans, La.	Richmond, Va.
Boston, Mass.	Fort Worth, Texas	Philadelphia, Pa.	Rochester, N. Y.
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			Washington, D. C.

ALBERENE SOAPSTONE

Natural quarried stone of medium hardness, blue-gray in color, produced and fabricated for more than 50 years; used in increasing quantities for:

- Table Tops and Backs
- Reagent Shelving
- Fume Hoods, Gutters
- Sinks, Drainboards
- Tanks and Tank Linings
- Toilet Partitions
- Shower Compartments
- Interior and Exterior Trim
- Door and Window Sills
- Fireplace Linings, Hearths
- Spandrels

ALBERENE TREAD STOCK

Selected stone of extreme hardness, reserved exclusively for Stair Treads, Landings, Platforms, and Flooring. Abrasive tests show the highest durability factor on the U. S. Bureau of Standards scale of any natural stone commercially used for these purposes. Its siliceous nature makes it non-slip wet or dry.

GRADE 25 ALBERENE

Variety of extremely hard stone, especially selected for laboratory working surfaces. Takes a permanent high sheen when rubbed down with oil.

ALBERENE BLACK SERPENTINE

This natural stone is becoming extremely popular. Its great resistance to weather action makes it desirable for exterior as well as interior work. When sand-blasted (as in spandrels) the fine tracery of the designs stands out against the polished black surface.

ALBERENE TREMOLITE

An interesting addition to the line. In honed finish, shows clear white markings. Two varieties, one polishes to a dark green, the other to a dark blue-gray.

PHYSICAL AND CHEMICAL PROPERTIES

All grades of Alberene Stone are homogeneous and finely granular in all directions, dense and non-stratified, chemically resistant, impervious and non-staining. Alberene soapstone is easily machined—bored, slotted, grooved, tongued, turned—without splitting or spalling. Use of thin sections (⅞ in.) makes for economy.

METHOD OF CONSTRUCTION

Alberene laboratory fixtures are practically one piece structures of solid stone. Table top slabs are united by a practically invisible joint employing a strip of non-corrosive metal cemented in grooves, with abutting slab edges sealed with acid-proof cement. Fume hoods, sinks and tanks are assembled with tongue-and-groove joints held by hidden bolts and nuts and cemented—permanently gas and liquid tight.

SERVICE IN DESIGN AND INSTALLATION

Every laboratory of major importance equipped in the past 50 years has used Alberene soapstone wholly or in large part. Out of this experience the company offers an advisory service, freely available to school authorities and architects.

MANUFACTURING FACILITIES

Quarries and mills at Schuyler, Virginia, are the largest in the world devoted exclusively to the production and fabrication of special purpose stone.

Section of Chemical Engineering Laboratory, Rensselaer Polytechnic Institute, Troy, N. Y.

Virginia Alberene Stone Stair Treads and Platforms in Woodrow Wilson High School, Washington, D. C. Nathan C. Wyeth, Municipal Architect.

GENERAL CERAMICS COMPANY

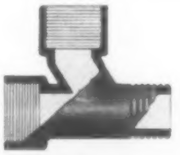
Manufacturers of Acid-Proof Chemical Stoneware, Laboratory Equipment

30 Rockefeller Plaza, New York, N. Y.

Buffalo Chicago Los Angeles Portland San Francisco Seattle Tacoma Spokane Montreal

The Chemical Stoneware Division of General Ceramics Company makes a complete line of acid-proof chemical stoneware equipment for chemistry and physics laboratories in educational and research institutions, for general industrial chemical purposes, and for hospitals, electro-plating plants, newspapers, photo-engraving shops, and other establishments where corrosive fluids are used.

General Ceramics Chemical Stoneware Laboratory Equipment is widely used in educational institutions throughout the country. In fact, a list of the colleges and universities with chemistry laboratories equipped with General Ceramics Chemical Stoneware is practically a roster of our leading institutions of learning, including among many others Yale, Harvard, Vassar, Radcliffe, Duke, Pittsburgh, Wesleyan, Lehigh, Tulsa, Toledo, Berea, Purdue, Vanderbilt, McGill, California Institute of Technology, and the Universities of Maryland, Illinois, New Hampshire, Connecticut, Indiana, Pennsylvania, Ohio, Wisconsin, Nevada, California, and California at Los Angeles. General Ceramics equipment is used also in such buildings as the Walter Reed Hospital in Washington, the Curtis Publishing Company Building in Philadelphia, and in New York, the Times Building, Metropolitan Life Building, and United States Assay Office.



TY Fitting

Socket Pipe

Quarter Bend

Description

General Ceramics Chemical Stoneware is a dense granite-like material with an attractive glazed surface. Both the glaze and the body of the ware are completely impervious to all acids and other chemicals, excepting hydrofluoric acid. The surface glaze is an integral part of the ware itself and therefore free from crazing and cracking. General Ceramics ware is mechanically strong, leakproof, and easy to keep clean, and it cannot contaminate the chemicals handled. It lasts indefinitely and there is no upkeep or replacement expense.

Laboratory Sink with integral back and side. Can be furnished without back and side in various types and sizes as required

Laboratory Sink with double drainboard. Can be furnished also without the integral back, with single drainboard (either right or left), and with details of construction as required

The General Ceramics line of stoneware equipment includes laboratory sinks, drain lines and fittings, sumps, fume ducts, pumps, ventilating fans, and countless other items.

Engineering Service and Catalogues

Our Engineering Department will gladly assist in selecting the right stoneware equipment for any requirements. We cooperate in laying out laboratories and other buildings where corrosive products are handled, also in the design of special chemical apparatus. New bulletins on General Ceramics Laboratory Sinks and on Acid-Proof Pipe and Fittings will be furnished on request.

Specifications

Specifications should read as follows: "All parts of this installation subject to the action of acids or acid wastes are to be made of high-grade acid-proof chemical stoneware manufactured by the General Ceramics Company of New York."

MAURICE A. KNIGHT

Acid, Alkali and Corrosion Proof Chemical Stoneware

227 Kelly Avenue, Akron, Ohio

55 West 42nd St., New York, N. Y.
618 Fidelity Bldg., Cleveland, Ohio
903 United Bldg., Niagara Falls, N. Y.

314 Stephenson Bldg., Detroit, Mich.
1934 Gravois, St. Louis, Mo.

203 N. Wabash Ave., Chicago, Ill.
1033 Merchants Exchange Bldg., San Francisco, Calif.
3465 Marlowe Ave., Montreal, Quebec, Can.

PRODUCTS

Acid Waste Pipe and Fittings
Acid-Proof Fume Ducts
One-Piece Laboratory Sinks
Acid-Proof Table Troughs
Neutralizing Sumps
Tanks, Jars, Filters, etc.

SOME INSTALLATIONS

Akron University
McGill University
Purdue University
Ohio State University
Brooklyn College
Princeton University
Northwestern University
University of Arkansas
University of California
University of Washington
University of West Virginia
Mellon Institute of Industrial Research

KNIGHT-WARE

Knight-Ware is an improved ceramic material that is dense, tough and wholly inert to the action of chemical solutions or gases, weak or strong, hot or cold (Hydrofluoric acid and hot caustic solutions excepted). Its acid-proof quality does not depend upon any glaze or surface treatment. "It is the body itself" that is entirely acid-proof. Knight-Ware equipment, properly installed, is trouble-free and permanent.

LABORATORY SINKS

Knight-Ware sinks are custom-made to specified measurements without extra cost. The one-piece construction, smooth surfaces, rounded corners and acid-proof quality mean a freedom from leaks and a cleanliness that is permanent. Splash backs, drainboards, aprons and outlets of several styles may be had as integral parts of the sink. Bottoms are sloped to insure complete drainage. The finish is a rich brown salt glaze that will not stain or peel.

ACID WASTE PIPE AND FITTINGS

Knight-Ware pipe and fittings are made in standard designs in any bore from 1 to 60 inches and straight lengths up to 5 feet. Special pieces to fit unusual places or to eliminate extra joints are available at low cost. Knight-Ware pipe is light in weight, strong and acid-proof.

Joints, packed and poured to our specifications, are tight and lasting.

PressureFlex, our new type rubber joint, provides a positive seal with a minimum of time and labor.

KNIGHT-WARE FUME DUCTS

Ventilating pipe is available in round or rectangular shapes in bores up to 60 inches and with bell and spigot, flanged or plain butt end connections. Specify Knight-Ware for lasting protection.

SERVICE

If you are planning a new laboratory or modernizing your present one, we offer our knowledge and practical experience gained from scores of Knight-Ware installations.

Our fully illustrated Laboratory Equipment catalog will be sent upon request.

Fig 237 RD Sink with right hand drainboard. Available with left hand or double drainboards and apron.

275A Table Trough

268 Knight-Ware S-Trap with Cleanout

PACIFIC FOUNDRY COMPANY LTD.

551 Fifth Ave.
New York

3100 Nineteenth St., San Francisco
(AGENTS IN PRINCIPAL CITIES)

1400 So. Alameda St.
Los Angeles

SPECIFICATION

All acid waste and acid vent piping shall be of approved high silicon cast iron bell and spigot type and shall contain: Not less than 14.25% and not more than 15% silicon; total carbon content below 1.12% and above .50% manganese below .50%; sulphur below .05%

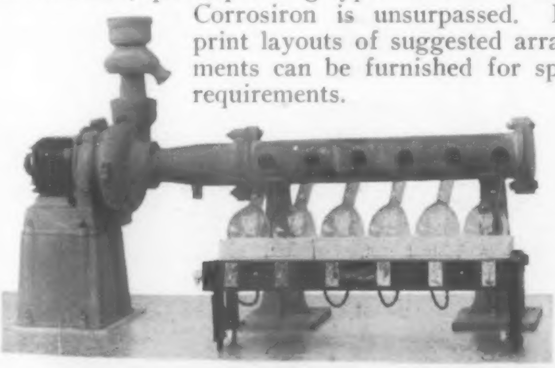
PIPE AND FITTINGS

Corrosiron Bell and Spigot pipe conforms in all respects to the specifications of the U. S. Government, Board of Education of the City of New York, Stanford University, and of leading public architects and engineers.

Dimensions correspond to A.S.M.E. standards for extra heavy soil pipe and fittings.

LABORATORY ACID DIGESTION APPARATUS

Acid Digestion becomes a cleaner, safer, and more dependable operation when your laboratory is equipped with Corrosiron digestion apparatus. Fume-Hoods can be avoided. Direct suction through Corrosiron acid resisting fans assures inward flow of fumes under conditions of rapid boiling. Fan motors are the new, quiet-operating type. The durability of Corrosiron is unsurpassed. Blueprint layouts of suggested arrangements can be furnished for special requirements.



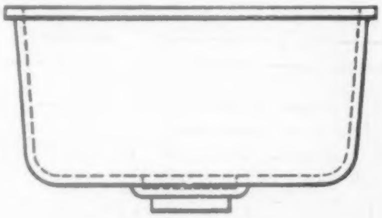
FANS

Corrosiron Fans have casings, impellers, and side plates of Corrosiron. Fan casings are provided with outlets permitting drainage of condensate. Fans are fume-tight.

Acid Fumes should be exhausted through Corrosiron Bell and Spigot pipe. Fittings, dampers, hood outlets and drains can be supplied of Corrosiron.

SINKS

Corrosiron sinks offer the advantage of low original cost, complete acid durability (except hydrofluoric) and immediate availability from stock.



RECENT REPRESENTATIVE INSTALLATIONS OF CORROSIRON EQUIPMENT

- University of Texas
- University of Minnesota
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- Columbia University
- Stanford University
- University of California
- University of Washington
- U. S. Bureau of Mines
- U. S. Food and Drug Administration
- U. S. Appraisers Building

CORROSIRON

MADE IN U.S.A.

HIGH SILICON ACID RESISTING IRON

THE UNITED STATES STONEWARE CO.

Works (Since 1865): Akron, Ohio NEW YORK OFFICE: 60 East 42nd Street

LOS ANGELES: Hollingsworth Building CHICAGO: 20 N. Wacker Drive SAN FRANCISCO: 116 New Montgomery Street

Acid-Proof Chemical Stoneware Laboratory Sinks

"U. S. **Standard"** Acid-Proof Sinks are widely used in laboratories of universities, schools, hospitals and industrial companies.

The construction is **one-piece,** without seams or joints. The material is non-porous and non-absorbent. The corners are well-rounded and the surface smooth. Special sizes can be made to fit any desired space.

Glaze—Our exclusive "Hy-Gloss" salt glaze has a high lustre, dark brown finish and is an integral part of the body itself.

Guarantee—Our products are unconditionally guaranteed to be acid, alkali and corrosion proof throughout the body, with or without the salt glaze.

Bulletin—Write for Bulletin No. 504 giving full information.

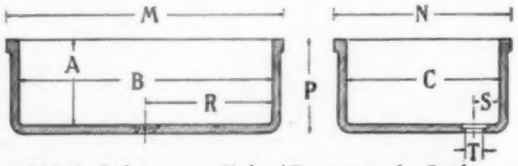

Fig. 112-A Laboratory Sink (Countersunk Outlet to take Metal Plug).
Fig. 112-ASP, Ditto, but with Integral High-Back.

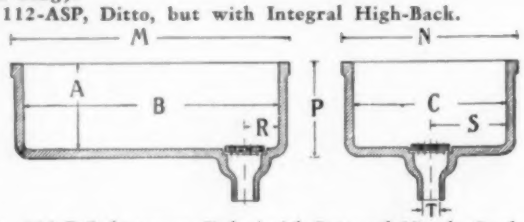

Fig. 112-B Laboratory Sink (with Integral Nipple Outlet and Removable Strainer).
Fig. 112-BSP, Ditto, but with Integral High-Back.

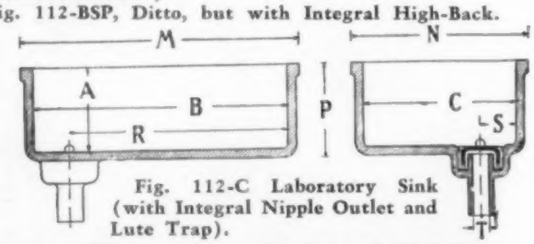

Fig. 112-C Laboratory Sink (with Integral Nipple Outlet and Lute Trap).
Fig. 112-CSP, Ditto, but with Integral High-Back.

DIMENSIONS OF "U. S. STANDARD" ACID-PROOF SINKS

Size No.	B	C	A	M	N	P	Code Word
700	11	9	8	14	12	9	Tab
701	14	10	6	17	13	7	Tacit
702	16	8	6	19	11	7	Tack
703	15	14	6	18	17	7	Taffy
704	16	12	6	19	15	7	Tag
705	16	16	9	19	19	10	Tale
706	18	10	11	21	13	12	Talon
707	18	14	7	21	17	8	Tamp
708	18	14	10½	21	17	11½	Tang
709	18	16	6	21	19	7	Tape
710	20	12	7	23	15	8	Tally
711	20	12	12	23	15	13	Tar
712	20	16	7	23½	19½	8¼	Taunt
713	24	15	8	27½	18½	9¼	Tenor
714	32	16	7	35½	19½	8¼	Terse
715	30	20	8	33½	23½	9¼	Thumb
716	36	18	7	39½	21½	8½	Tiger
717	42	20	12	45½	23½	13¾	Toast

Integral Backs on No. 700 to No. 709 sinks are 8 in. high and are 10 in. high on the larger sizes.
Special sizes can be made to order.

Other Products—Laboratory Table Troughs, Hemispherical Sinks, Sumps or Dilution Basins, Kjeldahl Equipment, Gas Generators, Laboratory Chlorine Cells, Suction Filters, Acid-proof Jars and Tanks, Burner Guards, Laboratory Jar Mills, Funnels, Exhaust Fans, etc.

ACID-proof Chemical Stoneware Piping

Patented "FLEXLOCK" Rubber Joints make a perfect and economical joint between two pieces of Chemical Stoneware Pipe. Equally satisfactory for vertical and horizontal drainage and fume duct lines.

"FLEXLOCK" Joints are the ONLY joints insuring all these advantages: **Positive seal**—No joint leaks. **Flexibility**—Takes care of expansion and building vibration. **Installation ease**—No other joints can be made so quickly. **Permanence**—No joint replacements. **Low installation cost**—Cheaper per laid foot than poured joints. **Unaffected by any fluid.** Even handles solvent hydrocarbons.

There is no other commercial product which is more universally resistant to acids, alkalis and corrosive chemicals and gases. Bromine, ferric chloride, sulphuric, sulphurous, nitric and hydrochloric acids of any concentration can all be handled with perfect safety.

The hubs are 4-in. deep and both the spigot and hub ends are deeply corrugated. Standard pipe lengths are 60 in. and are guaranteed straight and accurate.

Our line is complete, including elbows, bends, Y's, TY's, traps, crosses, sumps, floor drains, etc.

Cross-Section of "FLEXLOCK" Rubber Joint for Bell-and-Spigot Pipe

ACID-PROOF SINKS WITH INTEGRAL DRAINBOARDS

(One-piece)

Fig. 533-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 533-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 533-CSP (with Integral Nipple Outlet and Built-in Lute Trap).

Size No.	B	C	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
307	18	14	7	8	37½	16½	8⅞	18	197	Tong
312	20	16	7	10	39¾	19	9⅛	18	285	Tope
313-A	24	18	8	10	43¾	21	10⅛	18	348	Tory
315	30	20	8	10	49¾	23	10⅛	18	410	Tuch

Sinks are made with drainboards at right hand or left hand. Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral back and sinks without integral backs can also be supplied.

Fig. 536-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 536-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 536-CSP (with Integral Nipple Outlet and Built-in Lute Trap).

Size No.	B	C	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
507	18	14	7	8	54	16⅛	8⅞	18	284	Trew
512	20	16	7	10	56	19	9⅛	18	402	Trig
513-A	24	18	8	10	60	21	10⅛	18	477	Trow
515	30	20	8	10	66	23	10⅛	18	546	Tude

Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral backs and sinks without integral backs can also be supplied.

E. I. DU PONT DE NEMOURS & COMPANY (INC.)

GRASSELLI CHEMICALS DEPARTMENT

Wilmington, Delaware

Atlanta	Charlotte	Cincinnati	Milwaukee	New York	Rensselaer	San Francisco 1400 16th St.
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Represented in Canada by CANADIAN INDUSTRIES, LTD., General Chemicals Division, Montreal and Toronto

LABORATORY REAGENTS

PREPARED ESPECIALLY FOR SCHOOL AND UNIVERSITY LABORATORIES

The names of two time-honored houses—Grasselli and Du Pont—are your assurance of highest quality and constant uniformity in these laboratory reagents. From their chemically-pure contents—to the colored plastic screw caps and matching labels—Grasselli C. P. Acids and Ammonium Hydroxide have been prepared in every detail to meet school, university and industrial laboratory requirements.

Specifications: Chemical analyses are printed on the labels. Contents conform to American Chemical Society (A. C. S.) requirements as well as our own rigid standards for purity and uniformity.

On five pint bottles quick identification is assured by colored plastic screw caps with matching labels—black for sulfuric, red for nitric, blue for hydrochloric, brown for glacial acetic and green for ammonium hydroxide.

Quantities: Reagents are packed in light weight, easily handled shipping containers, ready for prompt delivery from our nearest warehouse in these sizes:

Carboys
Five Pint Bottles (10 to a case)
One Pound Bottles (32 to a case)

Purchasers of carboy quantities are invited to secure supplies of refill labels for use on smaller size containers.

How to Order: Write today for prices on Grasselli C. P. Acids and the new catalog listing of chemicals. Orders can be placed through any of the sales offices listed above.

C. P. SULFURIC ACID

H_2SO_4	**Min. 95.5%**
Sp. Gr. at 60° F.	**Min. 1.84**
Maximum of impurities	Meets A. C. S. Specifications
NO_3 0.0000%	NH_4 0.0001%
Cl 0.0000%	Fe 0.00002%
As 0.000000%	N. V. M. 0.0004%
Hy. Met. (as Pb) 0.00008%	
Substances Reducing $KMnO_4$ (as SO_2) 0.0001%	

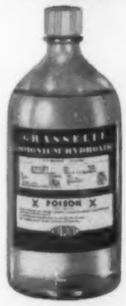
C. P. NITRIC ACID

HNO_3	**Min. 70.0%**
Sp. Gr. at 60° F.	**Min. 1.42**
Maximum of impurities	Meets A. C. S. Specifications
Cl 0.0000%	Sulfates (SO_3) 0.00008%
N. V. M. 0.0004%	Fe 0.00002%
Hy. Met. (as Pb) 0.00002%	As 0.000000%

C. P. GLACIAL ACETIC ACID

CH_3COOH	**Min. 99.5%**
Maximum of impurities	Meets A. C. S. Specifications
N. V. M. 0.0008%	Sulfates (SO_3) 0.0000%
Cl 0.0000%	Fe 0.00002%
Hy. Met. (as Pb) 0.00005%	
Dilution Test	Passes A. C. S. Test
Substances Reducing $KMnO_4$ (as SO_2) 0.015%	

C. P. AMMONIUM HYDROXIDE



Ammonia (NH_3)	**Min. 28.0%**
Sp. Gr. at 60° F.	**Max. 0.9015**
Maximum of impurities	Meets A. C. S. Specifications
Cl 0.00005%	CO_2 0.002%
Pyridine None	N. V. M. 0.0003%
PO_4 0.0000%	Sulfates (SO_3) 0.00025%
Hy. Met. (as Pb) 0.0002%	Fe 0.00003%
Substances Reducing $KMnO_4$ (as SO_2) 0.002%	

C. P. HYDROCHLORIC ACID

HCl	**Min. 37.0%**
Sp. Gr. at 60° F.	**Min. 1.1878**
Maximum of impurities	Meets A. C. S. Specifications
Free Cl 0.000%	Hy. Met. (as Pb) 0.0002%
Sulfites (SO_2) 0.00008%	N. V. M. 0.0004%
Sulfates (SO_3) 0.00008%	Fe 0.00001%
As 0.00000%	

THE EATON-DIKEMAN COMPANY

Manufacturers of Filter Papers

Mount Holly Springs, Penna.

LABORATORY FILTER PAPER FOR SCHOOLS, COLLEGES AND INDUSTRIES

FOR USE IN HEAVY AND LIGHT FUNNEL WORK, FILTER PRESSES AND FILTER MACHINES

E&D QUALITATIVE FILTER PAPERS

The Eaton-Dikeman Company, established in 1893, is today the world's largest manufacturer of quantitative, qualitative and industrial filter papers; carrying in stock more than fifty diversified grades of uniform quality and purity made under strict laboratory control and in a locality free from industrial aerial pollution. Each grade was created to meet requirements of the liquid to be filtered.

For years the E&D trademark has denoted high quality filter papers made from the best of raw materials under careful supervision of laboratory experts. Our filter papers are made with pure water giving assurance that they are free from chemicals and salts injurious to the filtered products. Eaton-Dikeman laboratory papers are sold by all laboratory supply dealers under their own special labels as well as under E&D labels. To be sure of obtaining E&D quality it is best to ask for the E&D label.

We make and stock seventeen grades of E&D qualitative filter paper suitable for funnel work. These are all described in our descriptive folder. Many of our qualitative grades have been used in educational institutions throughout the country for many years. Below you will find listed the physical characteristics of most of the popular qualitative laboratory grades.

NEW FILT QUANTITATIVE FILTER PAPERS

During the past year our Company has developed and created eight grades of quantitative filter papers to serve as substitutes for the many grades of quantitative filter papers imported from Europe. These quantitative grades will be known as New Filt filter papers and they are made of the very highest quality of pure white cotton fibre and are especially treated and processed to insure great purity and a low ash weight. New Filt Nos. 1, 3, and 4 have an ash weight the equivalent of any single acid washed imported filter paper. New Filt papers have been approved by many testing laboratories and are being used in many large industrial laboratories throughout our country, Canada and Mexico. New Filt papers are suitable for most analytical purposes where a double acid washed paper is not necessary.

E&D FOLDED FILTER PAPERS

These papers have uniformity and purity plus precision and speed, stocked in two grades in all standard sizes 12½ cm to 60 cm.

No. 192 rapid yet retentive, No. 193 medium fast, very retentive; both exceptionally strong, retaining the folds in the funnel and have a full rounded apex permitting an even distribution of the load, thereby preventing breakage at this point.

The folded papers can be supplied in twelve different grades to meet the requirements in the industrial as well as the laboratory field.

Packed 100 in a box. Samples sent upon request.

All E&D Qualitative and New Filt Quantitative Laboratory Filter Papers in all sizes up to 20″ diameter packed 100 circles in a box.

Filter Paper Clippings, E&D Lining Paper, E&D Bibulous Paper and Bibulous Booklets.

PHYSICAL CHARACTERISTICS OF MOST POPULAR LABORATORY GRADES

Grade	Color	Surface	Texture	Rapidity cc per Min.
607	White	Smooth	Med. Close	35-50
609	White	Smooth	Med. Close	30-45
612	White	Embossed	Med. Close	20-35
613	White	Smooth	Very Close	15-35
615	White	Creped	Fairly Open	75-150
617	White	Creped	Open	150-250
619	Gray	Creped	Fairly Open	75-150
620	Gray	Embossed	Fairly Close	45-70
629	White	Smooth	Med. Close	50-75

Note: Rapidity is number of cubic centimeters of distilled water filtered per minute in a 4″ 60° funnel.

F. J. STOKES MACHINE COMPANY

5960 Tabor Road (Olney P. O.), Philadelphia, Pa.

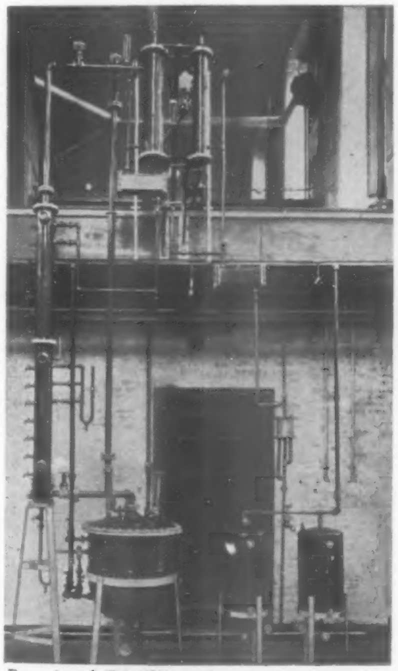
Representatives in New York, Chicago, Cincinnati, St. Louis, Cleveland, Detroit, Boston — Pacific Coast Rep. — L. H. Butcher Co., Inc.

SPECIAL EQUIPMENT FOR TEACHING AND RESEARCH

We have had the privilege of working with the directors of the Frick Laboratory at Princeton, the chemical engineering laboratories at the Universities of Columbia, Pennsylvania, Tulane, Florida, Penn State College, University of Shanghai and others, both here and abroad. We have engineered and manufactured equipment in great variety and large volume, for both laboratory and commercial services, for more than 40 years.

This broad experience enables our engineers to cooperate in a most practical way in designing and building the type of apparatus you require, apparatus so designed that data may be obtained for the demonstration of basic principles in teaching or research.

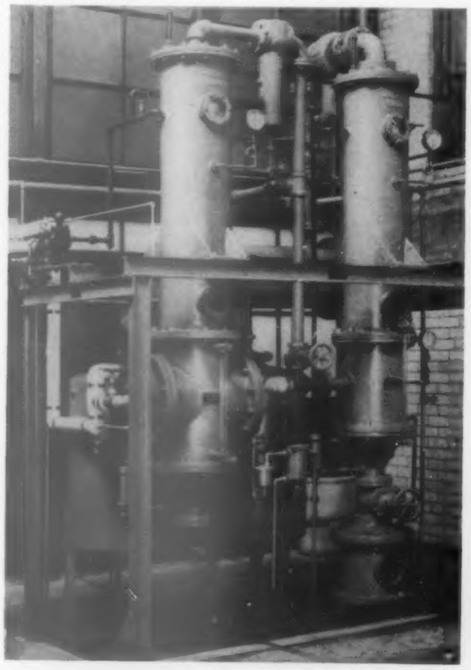
Consult with us about equipment needed to develop or expand your facilities . . . Vacuum Dryers, Vacuum Evaporators, Distilling or other special apparatus and for standard Water Stills, Dryers, High Vacuum Pumps, etc. We know how to build **economically** . . . will make specific suggestions and recommendations, if you will state your problems.



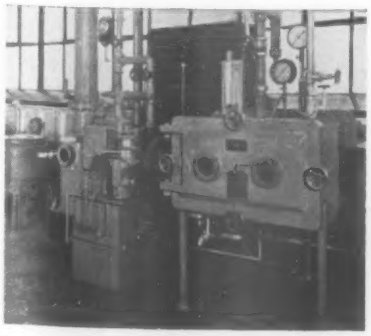
Fractional Distilling Apparatus specially designed so that all engineering data can be obtained—as installed at several universities

TABLET MACHINES

Widely used for chemical and metallurgical research, compressing chemicals, making experimental batches of catalytic tablets (that pack uniformly and expose large reaction surfaces) tabletting pharmaceuticals, etc. It makes tablets up to ½" dia. More than 2000 in use. Hand-operated or motor-driven models. Write for Catalog No. 401.

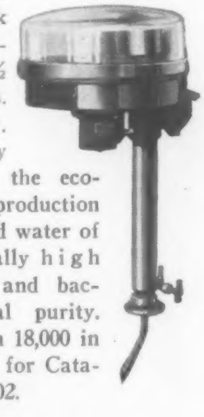


Double-effect Evaporator. Arranged so that either effect can be operated independently. Second effect arranged for crystallizing

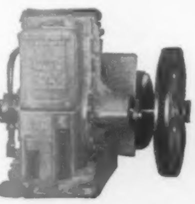


Laboratory installation of Vacuum Shelf Dryer with Surface Condenser and High Vacuum Pump

STOKES WATER STILLS



Made in 22 stock models, capacities ½ to 100 gals. per hour. Widely used for the economical production of distilled water of exceptionally high chemical and bacteriological purity. More than 18,000 in use. Ask for Catalog No. 402.



STOKES HIGH VACUUM PUMPS

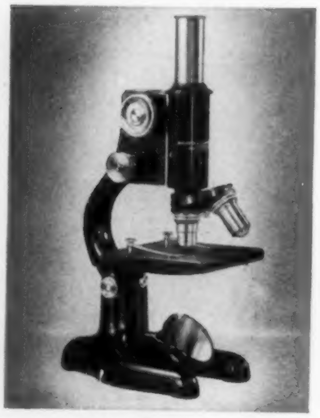
10 cu. ft. to 225 cu. ft. displacement. Produce and maintain vacuum within a few microns of absolute. Three moving parts only. Oil-sealed, rotary type. Built-in oil clarifier. Other features. Catalog 38-P. Ask also for Bulletin 902 on Portable, Quick-reading, High Vacuum Gauges.

BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester, N. Y.

New York — Chicago — Boston — Los Angeles — San Francisco
London, England — Toronto, Canada

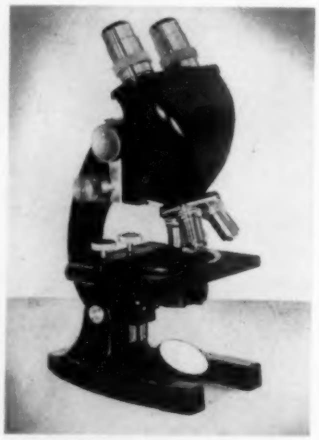
FB MICROSCOPE



Microscope FB is especially designed and built for elementary science work and its price, based on quantity production, is in line with the most restricted budget. It is ruggedly built to stand many years of hard class room usage. Its optics are of the same precision type that characterize the more expensive research type of instrument. Features include standard size, coarse and fine adjustments, double revolving nose piece, standard objectives and eyepieces, disc diaphragm, solid Bakelite stage, concave mirror, etc. Velvety black, wear-resisting finish—Chromium plated parts.

Microscope F is similar to the instrument above but fine adjustment has been eliminated in the interests of economy. Magnifications range from 20 to 310 diameters.

CTA MICROSCOPE



This microscope is especially adapted for advanced Biological work, for Medical Study and Diagnosis and as a general purpose microscope in universities. Has inclined binocular body (interchangeable with monocular tube for photomicrography) with parallel eyepiece tubes. Built-on mechanical stage holds slides 50 x 75 mm., permitting examination of the entire area. Abbe Condenser 1.25 N.A. in full ring mount is in rack and pinion substage. Revolving, dustproof nosepiece, centered and parfocalized at the factory. Optical equipment of uniform high excellence includes achromatic and fluorite objectives.

K TYPE BINOCULAR MICROSCOPE

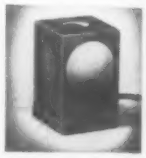
The great popularity of the K Type Binocular Microscope has prompted us to offer the Model "K" for schools and universities. Its range of magnifications of from 7X to 150X especially suit it for biological, bacteriological and paleontological work. An interesting feature of this series is the new dustproof Shuttle nosepiece, specially made for this series. This microscope gives stereoscopic, three dimensional effect. Image is upright and unreversed. Exceptionally wide field.

B & L REFLECTOR LAMP

This lamp fills a definite need in work with both the monocular or binocular non-objective microscope and the stereoscopic wide field microscopes. Elliptical mirror with adjustment provides diverging, parallel or converging light.

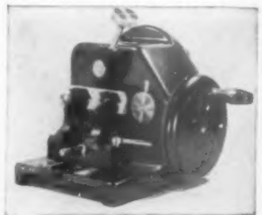
Jointed arm mounting permits all-angle illumination above or below stage. With adjustable transformer, light intensity is exactly adjustable to the work in hand.

OTHER MICROSCOPE LAMPS



Other B&L Microscope Lamps are available for various purposes in the school laboratory. The two shown herewith are (right) a substage lamp and (left) the Universal Microscope Lamp.

B & L MICROTOMES

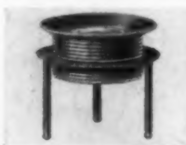


The B & L line of Microtomes is most complete. The Minot Automatic Rotary Microtome illustrated is ideal for rapid serial sectioning, cutting section with accuracy down to 1 micron in thickness. Feeding mechanism operates automatically. Dustproof operating mechanism. Catalog D-21 describes the complete line, including the new Precision Automatic Microtome—motor driven.

B & L SPECTROGRAPHS

The complete B&L line of Spectrographic Equipment covers every need. Models range from the Bunsen Spectroscope (illustrated) for elementary class room work to the large Littrow Spectrograph for examining complex alloys. Each is designed and built with the utmost care and due to our great experience in this field represents all of the best features necessary for both teaching and laboratory research. Catalogs D-221 and D-20 give complete detail.

QR MAGNIFIER



This is an adjustable tripod type magnifier which is placed directly over the specimen. Has double lens, magnifying 7.5X. Useful for the school laboratory. Other magnifiers for various purposes are available.

SEND FOR CATALOGS

For complete information on Laboratory Microscopes send for Catalog D-185. For information on B&L Balopticons see page 342 this catalog. Remember the instruments listed on these pages are but a small part of the B&L Line. If you have need for information on any optical products whatsoever, Bausch & Lomb will gladly be of service to you.

SPENCER LENS COMPANY

Buffalo, New York

Manufacturers of

Microscopes—Microtomes—Optical Measuring Instruments
Delineascopes—Photomicrographic Cameras

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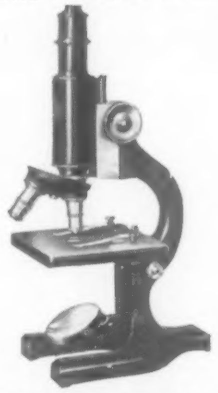


STUDENT MICROSCOPE No. 74

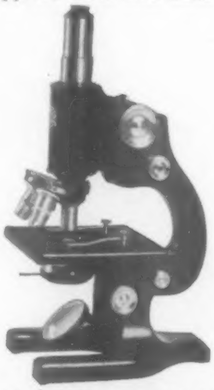
A low cost, standard size, quality instrument for classroom work requiring magnifications up to 360 diameters. Equipped with coarse adjustment only. Solid bakelite stage, 110 mm. x 105 mm., will not warp and is resistant to all ordinary laboratory reagents. Revolving disc diaphragm is easily rotated at edge of stage. Concave, adjustable mirror of standard diameter, is mounted in an adjustable fork. Substage condenser cannot be supplied with this instrument.

ELEMENTARY LABORATORY MICROSCOPE No. 66

This standard size microscope for biological laboratory work has the same high quality optics and mechanical parts found on the more expensive instruments. Equipped with coarse and fine adjustment. Substage condenser cannot be supplied with this instrument. Durable, bakelite stage 110 mm. x 105 mm. Sturdy, revolving disc type diaphragm under the stage is easily manipulated at edge of stage.

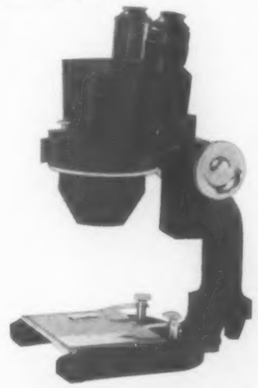
ROUTINE LABORATORY MICROSCOPE No. 63

This microscope meets the most rigid specifications for a sturdy, durable and precision laboratory instrument. Designed to accommodate a substage condenser for greater magnifications. Highest quality optical system. Has both coarse and fine adjustment. Durable bakelite stage 125 mm. square. An iris diaphragm, located under the stage, insures satisfactory modification of illumination for low power work.



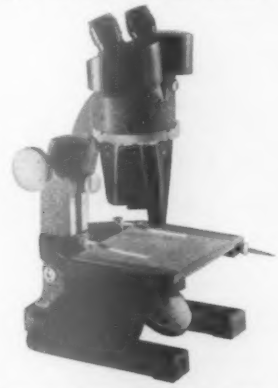
ADVANCED LABORATORY MICROSCOPE No. 33H

Designed for almost any type of microscopic observation because it permits the use of all standard Spencer microscope accessories. Has the following exclusive Spencer optical and mechanical features: (1) Balanced Optical System, (2) Dual-Cone Nosepiece, (3) Fork-Type rack and pinion Substage, (4) Rhodium Plated Parts. Has micrometer type fine adjustment. It is the microscope generally selected for medical work. Mechanical stage on No. 33MH has a range sufficient to cover 3" x 2" microscope slide.



JUNIOR STEREOSCOPIC MICROSCOPE No. 67

This instrument meets the demand for a low cost stereoscopic microscope for general classroom use. The vivid erected image aids inspection and analysis of the object. The paired objectives are of the same optical quality as those used on higher priced instruments and may be furnished in a special, dustproof revolving nosepiece. Supplied at slightly higher cost with base, mirror and inclination joint.



STANDARD STEREOSCOPIC MICROSCOPE No. 25

Notable improvements, the result of long cooperative experience with users of this type of equipment, distinguish the present Spencer Stereoscopic Microscope. Satisfactory stereoscopic vision depends upon depth of focus as well as angle and Spencer scientists have found a practical balance that provides depth as well as brilliant resolution. A large object field and resolution of fine detail are equally important features. A wide range of magnification, from 6.3X to 144X, is available.

FOR SPENCER STILL PROJECTOR EQUIPMENT SEE PAGE 343

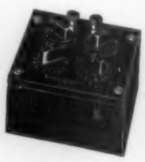
THERE IS A SPENCER MICROSCOPE FOR EVERY PURPOSE. WRITE DEPT. P13 FOR COMPLETE DETAILS

LEEDS & NORTHRUP COMPANY

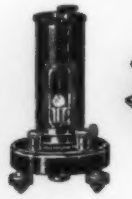
Measuring Instruments — Automatic Controls — Heat-Treating Methods

Logan & Stenton Avenue, Philadelphia, Pa.

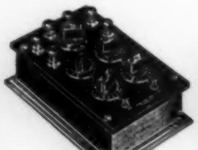
N.B.S. Type Resistor



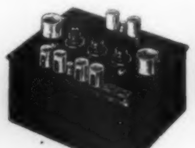
4-Dial Resistance Box



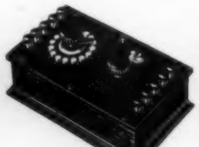
Reflecting Galvanometer



Inclosed-Switch Wheatstone Bridge



Campbell-Shackelton Shielded Ratio Box



Students' Potentiometer

Silsbee Current Transformer Test Set

INSTRUMENTS FOR RESEARCH, TEACHING AND TESTING

As a guide to the choice of instruments, all of which apply sound principles in reliable constructions, for specific work in laboratory, plant or field, we supplement our more detailed literature (indexed below) with a comprehensive catalog, listing the entire L&N line for research, teaching and testing. This condensed catalog serves as an illustrated price list and index, with brief descriptions. Ask for:

Electrical Measuring Instruments For Research, Teaching and Testing .... **Catalog E**

Standards. For use as reference or working standards in d-c and a-c bridge measurements, and in potentiometer measurements, we offer a wide choice of fixed and adjustable standards . . . d-c and a-c resistors, attenuators, inductors, mica and air capacitors, and standard (potential) cells. For complete listings, see Catalog E. Details about resistors in:

Resistance and Conductance Measurements .... **Catalog E-53**

Galvanometers and Dynamometers. For use as balance-point detectors in potentiometer or bridge measurements, and for calibrated deflection measurements, there are: d-c and a-c moving-coil galvanometers in a variety of reflecting and pointer types; Coblentz moving-magnet galvanometer, primarily for use with thermopiles in measuring radiant energy; astatic dynamometers, having unusually high sensitivity to power. Write for:

Galvanometers and Dynamometers .... **Catalog ED**

D-C Bridges. For measuring d-c resistance, we offer Wheatstone bridges, and for very low resistances, Kelvin double bridges. There is a choice of models for general resistance measurements, for resistance-thermometer temperatures, for locating faults in communication and power circuits, and for other tests. In addition, there are ratio boxes and slidewires. Further information about d-c bridges in:

Resistance and Conductance Measurements .... **Catalog E-53**
Type U Test Set .... **Catalog E-53-441(1)**
Type S Test Set .... **Bulletin 530**
Morse-Newhall Test Assembly .... **Folder E-53-441(1)**
Power Cable Fault Bridge .... **Catalog E-53-441(4)**
Students' Kelvin Bridge .... **Bulletin 434**
Kelvin Bridge Ohmmeter .... **Catalog EF-22C**
Mueller Bridges .... **Catalog E-33C(1)**
Body and Skin Temperature Measurements .... **Catalog E-33-423**

A-C Bridges. To measure inductance, capacitance, resistance and related a-c quantities, at commercial, audio and higher frequencies, we build a varied line of a-c bridges. See Catalog E; also:

Frequency Recorders and Indicators .... **Catalog N-57-161**
Electrolytic Conductivity Measurements .... **Catalog EN-95**
Sugar Ash Bridge .... **Catalog E-95-460(1)**

Potentiometers. There is a choice of L&N potentiometers adapted to a variety of emf measurements; and of others specialized to measure emf as a function of temperature, pH or other specific quantity. Described in Catalog E, and in:

Type K Potentiometers .... **Catalog E-50B(3)**
Students' Potentiometer .... **Catalog E-50B(1)**
Brooks Deflection Potentiometers .... **Catalog E-50B(2)**
Wenner Thermocouple Potentiometer .... **Catalog E-33A(1)**
White Potentiometers .... **Catalog E-33A(2)**
Body and Skin Temperature Measurements .... **Catalog E-33-423**
Apparatus for Checking Thermocouple Pyrometers . **Catalog E-33A-503**
Hydrogen-Ion Concentration (pH) Measurements ...... **Catalog EN-96**
Portable Universal pH Indicator .... **Catalog E-96(1)**
Portable Glass-Electrode pH Indicator .... **Catalog E-96(2)**
Thermionic Amplifier .... **Catalog E-00 A**

Jrl Ad ENT-0441(1)

Photometers. Bar photometer, generally used for measurements of highest precision; visual and photoelectric sphere photometers, with which spherical candlepower of a lamp can be determined in a single measurement; distribution photometer, for determining polar light flux distribution around large lamps and luminaires; Macbeth Illuminometer, a compact portable photometer for measuring illumination . . . all described in:

Photometers .... **Catalog E-72**

Miscellaneous Apparatus. Specialized measuring equipments facilitate certain routine tests: characteristics of magnetic materials; ratio and phase-angle of instrument transformers; specific inductive capacity and power factor of solid and liquid dielectric materials; insulation resistance; chemical analysis, using the dropping-mercury cathode method; and other tests. Described in Catalog E; further details in:

Potential Transformer Test Set .... **Bulletin 716**
Silsbee Current Transformer Test Set .... **Bulletin E-50-501(1)**
Modified Schering Bridge for Specific Inductive Capacity and Power Factor of Dielectrics .... **Catalog E-54(2)**
Power Factor Measurements by the Phase-Defect Compensation Method .... **Catalog E54(3)**
Insulation Resistance Test Set .... **Catalog E-54(1)**
Resistance and Conductance Measurements .... **Catalog E-53**
Electro-Chemograph (Recording Equipment for Dropping Mercury Electrode Applications) .... **Technical Publication E-94(1)**

Primary Elements, Accessories, Supplies. Thermocouples, resistance thermometers, pH electrodes, conductivity cells, accessories and supplies are described in Catalog E and in specific publications. See also:

Thermocouples .... **Catalog N-33A(6)**
Keys and Switches .... **Catalog EU2**
Operating Supplies for L&N Equipments .... **Catalog ENT-W**

INDUSTRIAL-TYPE INSTRUMENTS AND FURNACES OFTEN USED IN LABORATORIES

Industrial-type instruments and furnaces have many laboratory uses. Micromax recorders reading directly in temperature, pH or other units furnish continuous chart records of test runs. Sometimes, recorders which control automatically, and non-recording controllers are used. Industrial-type indicators, portable models especially, are often used for a variety of measurements; optical pyrometers, for high temperatures. In metallurgical laboratories, Hump and Homo methods for hardening, carburizing, nitriding, tempering and annealing are applied through small electric heat-treating furnaces. Publications describing this industrial-type equipment can be had on request. Please be specific.

POWER-PLANT INSTRUMENTS

Instruments for the power plant are described in:

Combustion Control for Boiler Furnaces .... **Catalog N-01-163**
Speed Recorders .... **Folder N-27(1)**
Flowmeter (Centrimax) .... **Catalog N-28**
Temperature Instruments for the Steam Plant ..... **Catalog N-33-163**
Temperature Instruments for Elec. Power Equip ... **Catalog N-33-161**
Frequency Recorders and Indicators .... **Catalog N-57-161**
Frequency Controller, Industrial Type .... **Catalog N-56-161(1)**
Load Telemetering and Totalizing Recorders .... **Catalog N-58-161**
CO_2 Recording Equipment for Flue-Gas Analysis .... **Catalog N-91-163**
Smoke-Density Recorders .... **Catalog N-93**
Condensate-Purity Instruments for Steam Plant .... **Catalog N-95-163**
Corrective Water Treatment .... **Bulletin N-96S-744A**

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

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ELECTRIC LABORATORY APPARATUS AND EDUCATIONAL SERVICE for COLLEGES AND TECHNICAL SCHOOLS

Motors
Generators
Switchboards
Converters

Control Panels
Relay Demonstration Panels
Transformers
Electrical Measuring Instruments

For use in school laboratories the General Electric Company has given special attention to the design and manufacture of various instruments, machines and devices that embody the characteristics of the corresponding commercial types, but in smaller sizes and ratings, at less expense.

General Electric engineers will be glad to recommend apparatus to meet your special conditions if you will give them details such as the type of course, number of students, laboratory or shop space available, etc.

Publications, technical information, motion-picture films, illustrated lectures, etc., are made generally available without charge. Further than this, liberal discounts are allowed to educational institutions.

ELECTRIC MEASURING INSTRUMENTS

A well-equipped college laboratory will need an assortment of standard electric measuring instruments of all types and capacities, since there is hardly an experiment performed by the students which does not require their use.

The satisfaction and benefit derived from these laboratory experiments depend to a very large degree upon the accuracy of the instruments. There is nothing more discouraging to the student than to find that his results do not check. When selecting laboratory instruments, too much care cannot be given to accuracy, permanence of calibration, deadbeat indications, and legibility of scales. Of course, local disturbances should not influence readings and, in many cases, low internal losses are important. If, added to these features, instruments of structural simplicity and fine appearance can be procured, one important problem facing the laboratory director will have been solved.

In the design and construction of G-E electric measuring instruments, careful consideration is given to all these details. The instruments described on the following pages have been selected from a wide range of the Company's products as being most suited to school laboratory use.

General Electric, aware that electric laboratory instruments are subjected to extremely rough usage in the hands of inexperienced students, offers a prompt and complete repair and recalibration service to college and technical schools at cost.

PORTABLE INSTRUMENTS

Types AP-9 and DP-9
Medium Size
For Alternating and Direct Current

Types AP-9 and DP-9 instruments are of medium size, for general laboratory and testing work. They are available as ammeters, voltmeters and single-phase wattmeters in a wide range of ratings. The case is of attractive, durable molded Textolite, and the long scale (4.1″) is equipped with a mirror which, in conjunction with the knife-edge pointer, practically eliminates error due to parallax. The accuracies of the Types AP-9 and the DP-9 are within ¾ of 1 per cent, and ½ of 1 per cent of full scale value, respectively. An external zero adjuster is provided on the outside of the case. For further information ask for GEA-1784.

Type AP-9 Voltmeter

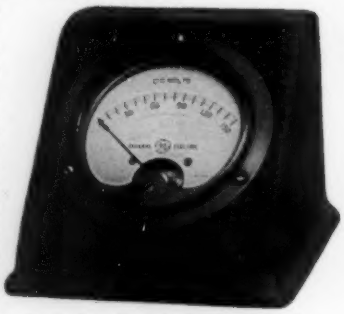
Combination volt-wattmeters are also available. One is rated 150 volts, 500 watts, and has a convenient plug and socket connector to adapt it for testing home appliances. Other ratings are also available.

G-E also manufactures high precision portable instruments of dependability and long service, Types P-3 (Alternating) and DP (Direct Current). For complete information, ask for Catalog GEA-612.

SMALL PANEL INSTRUMENTS

Alternating and Direct Current

This line of instruments includes voltmeters, ammeters, milliammeters and microammeters (Types AO and DO). Accuracy is within 2 per cent of full-scale value. Cases are of durable molded Textolite. Applications include welding sets, battery-charging panels, radio test sets, etc. Type AO-21 or DO-40 is supplied with a universal-type case, for flush or surface-mounting. Type AO-22 or DO-41 has a wide flange for flush mounting; diameter over flange, 3½ inches. Ask for GEA-1239.



Portable Stand for 3½-Inch Instruments

SWITCHBOARD INSTRUMENTS

Rectangular Type—For Alternating and Direct Current

Rectangular

G-E rectangular-type switchboard instruments, include voltmeters, ammeters, wattmeters, power-factor meters, and frequency meters, for alternating current (Type AD-6); and voltmeters and ammeters for direct current (Type DD-6). These instruments are of the highest quality; the accuracy of the voltmeters, ammeters and wattmeters is within 1 per cent of full scale.

Other features include: dull-black finish metal case, anti-parallax scale and pointer, antiglare glass; long, clearly marked scales (5.1"); magnetic damping, high torque and attractive appearance. For complete description, ask for GEA-1758.

PERMANENT MAGNET OSCILLOGRAPHS

The six-element, general-purpose oscillograph, Type PM-10, is designed for convenience in operation under all test conditions. It is furnished with six galvanometers for current or potential measurements, and a timing vibrator provides a seventh record when it is desired. Watt galvanometers, interchangeable with potential galvanometers, are available.

This oscillograph is suitable for use in the laboratory or in the field. It produces records 3⅝" or 6" wide, either in a magazine film holder giving 3 or 5 exposures on a roll film, or in continuous-drive film holder giving continuous records up to 20 feet in length. A continuous-drive record paper holder is available, which gives records up to 100 feet in length.

The Portable two-element oscillograph, Type PM-12, is entirely self-contained. This instrument meets the needs of schools and colleges where it is desired to show two simultaneous records (current and voltage) on a viewing screen. A rheostat is available which may be connected in series with the current element, thus providing for two voltage records. It also provides means of making inexpensive oscillograms of recurrent phenomena.

A magazine film holder is included with this instrument. A continuous-drive film holder for use in recording transient phenomena can also be furnished.

Six-Element Type PM-10

Two-Element Portable

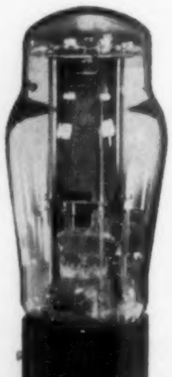
ELECTRON TUBES

About a year ago we introduced to the colleges a new laboratory diode—the FP-400 kenotron. Shortly after we featured the group of three triodes—PJ-7, PJ-8, and GL-418. These tubes have made a place for themselves in the electronics laboratory as is shown by the steadily increasing sales to schools and colleges.

THE DIODE

The FP-400 kenotron has a pure tungsten filament located axially in a cylindrical carbonized nickel anode. This makes it especially well adapted for studying and demonstrating the important fundamental laws of the high-vacuum tube. Among these studies may be listed: (a) limitation of current by space charge, (b) relation between temperature and electron, and (c) the effect of a magnetic field on electron flow between cathode and anode.

Information on the essential dimensions of the electrode structure is supplied with this tube. This will enable the student to compare experimental results with calculated data.



The Diode

The Triode

THE TRIODE

Familiarity with the triode is important, not only for itself, but because it forms the basis of the more complicated multi-grid tube. A systematic study is made possible with this set of three triode tubes. They are identical except for the pitch of the grid winding.

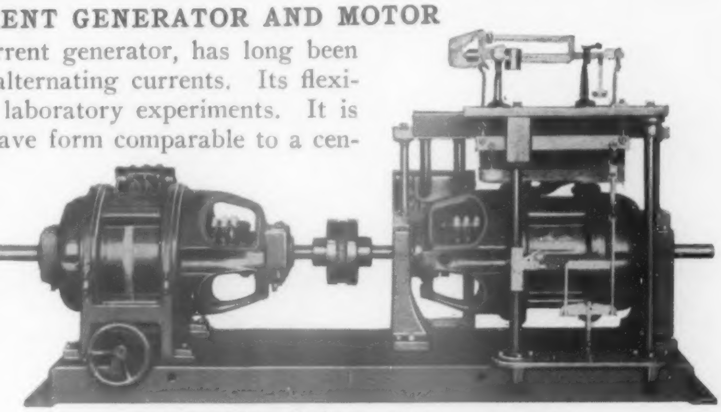
Many valuable laboratory experiments will readily suggest themselves to the instructor. These include determination of triode characteristics, the triode constant, the grid-current characteristics, and the effect of amplification factor in a voltage amplifier.

Further details regarding these tubes, including characteristics, dimensions, suggested experiments, etc., as well as special educational prices, will be sent on request. Address the Educational Section of the General Electric Company at Schenectady, New York.

ALTERNATING-CURRENT GENERATOR AND MOTOR

The Type AHI 6-pole, 5 Kva alternating-current generator, has long been the standard for teaching the fundamentals of alternating currents. Its flexibility permits its use in a very wide variety of laboratory experiments. It is now manufactured with skewed poles giving a wave form comparable to a central station wave, or with straight poles which shows the effect of tooth ripple on the wave form excellently.

The Type AHI is designed to run as an alternator or synchronous motor. Extra rotors are available which, when substituted in place of the salient-pole rotor, convert the machine into a squirrel-cage induction motor, a phase-wound-rotor induction motor or frequency converter.

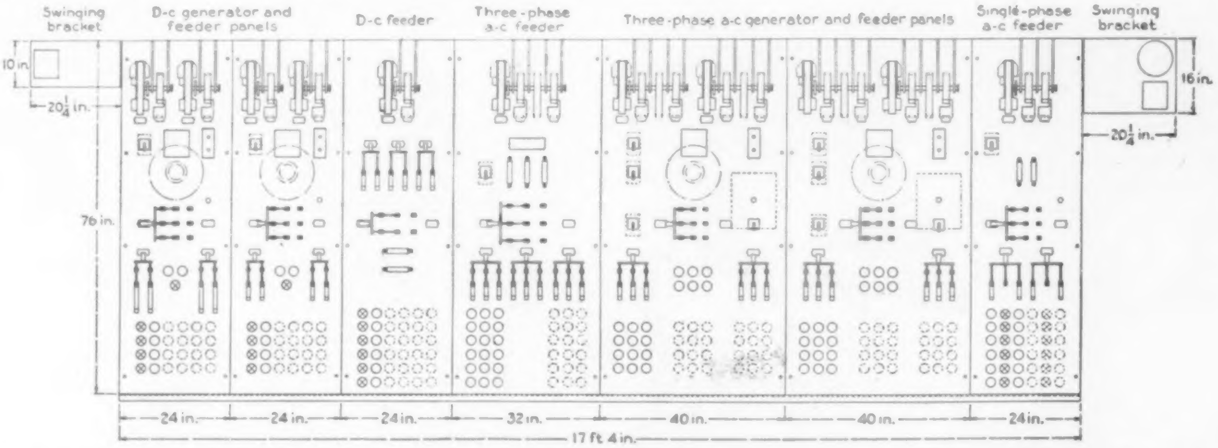


5 Kva Phase-displacement Dynanometer Set

A phase displacement set and a phase displacement dynamometer set, illustrated, have been developed around the most commonly used 5 Kva rating. These two-unit sets are designed for maximum flexibility in the laboratory.

LABORATORY SWITCHBOARD

General Electric has developed a switchboard to meet the needs of the technical school laboratory which provides maximum flexibility. This board provides for parallel operation of a-c and d-c generators, under standard conditions, and it supplies the laboratory with a very effective and variable feeder system. A great asset to this feeder system is the plug switch also here illustrated, used extensively throughout the board. This facilitates making and changing connections and saves times and trouble in shifting power to circuits where needed.



The holes shown dotted are for CR 1939 receptacles to be purchased separately, mounted by the purchaser, and connected to the auxiliary plug-switch panels. Holes not placed in service may be buttoned

A SIMPLE DEMONSTRATION MOTOR

The squirrel-cage induction motor is probably the commonest electrical apparatus in the industrial field for the purpose of transmitting torque. Its use is universal. The accompanying picture depicts a recently developed induction motor (special Type K-225, 2-hp., 2/3 phase) designed to show how the electrical and magnetic circuits are set up, and to demonstrate, in a practical manner, the common connections of lapped windings, illustrating phase grouping, coil spacing, and coil connections.

The motor can be connected for 4-, 6-, or 8-pole operation, from either a 2- or 3-phase source. It has 36 stator slots and 45 rotor slots. The 36 stator coils have all 72 leads brought out to a circular Textolite terminal board mounted on the frame. This board is so marked that the location of all coil ends and stator slots can be clearly checked with their respective terminals. Not only is every coil shown schematically but every rotor bar as well.

TRANSMISSION PHOTOMETER

The transmission photometer is especially valuable in spectrographic work—in fact, the two in our own laboratories are in constant demand. In this new type, the spectrographic plate rests horizontally on the stage, thus dispensing entirely with the need of supporting clamps as in other types where the plate is held in a vertical position.

The comparison of light values is facilitated because the design of the device is such that the screen and the galvanometer scale can be viewed simultaneously, since they are both in the same range of vision.

By means of a suitable optical system, a spot of uniform illumination is thrown on the plate to be measured. A small selected area is then magnified about 20 diameters, and the comparative transmission is determined by means of a light cell and galvanometer.

Obviously, this photometer is not limited to spectrographic work, since it lends itself also to a study of light transmission of other materials, such as cloth, paper, etc.

DYNAMOELECTRIC AMPLIFIER

Though but recently developed, the Amplidyne generator is already productively engaged in various fields of industry. For example, it divides the load between large d-c motors operating in parallel; it controls reel tension in wire-drawing-machines; it maintains close speed regulation of tandem cold-strip mills. Since this new machine will be important to future engineers, professors will undoubtedly wish to investigate its educational possibilities at this time.

SIX-UNIT HARMONIC MOTOR-GENERATOR SET

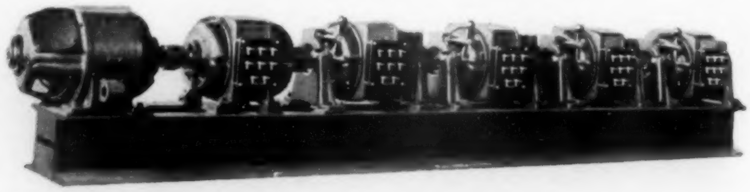
Some of the applications for which this set can be used are: meter calibration, iron testing, high-voltage measurements, wave analysis, phase-displacement problems, and telephone-interference studies. The second-harmonic generator has been included for reproducing certain unsymmetrical wave shapes.

The harmonic motor-generator set consists of:

(a) a 10 hp., 230- or 115-volt d-c, shunt wound, 40 deg. C. continuous, ball bearing, 3600 r.p.m. motor capable of 10% speed variation above and below normal speed;
(b) a fundamental or 60-cycle generator rated 5 kva., .95 p-f., 220 volts, 3 phase, 60 cycles, 3600 r.p.m., 50 deg. C. continuous, ball bearing;
(c) a second-harmonic generator rated 2 kva., .95 p-f., 88 volts, 3 phase, 120 cycles, 3600 r.p.m., 50 deg. C. continuous, ball bearing;
(d) a third-harmonic generator rated 2 kva., .95 p-f., 88 volts, 3 phase, 180 cycles, 3600 r.p.m., 50 deg. C. continuous, ball bearing;
(e) a fifth-harmonic generator rated 1 kva., .95 p-f., 44 volts, 3 phase, 300 cycles, 3600 r.p.m., 50 deg. C., continuous, ball bearing;
(f) a seventh-harmonic generator rated 1 kva., .95 p-f., 44 volts, 3 phase, 420 cycles, 3600 r.p.m., 50 deg. C., continuous, ball bearing.

All generators are equipped with a terminal board with eight leads brought out—the two d-c field leads and the six phase and neutral leads. All generators, except the fundamental, are pedestal-mounted, and are equipped with worm-gear and handle assembly for rotating the stator of each machine through 360 electrical degrees. A scale calibrated in electrical degrees is attached to each moving mechanism, with a pointer to indicate the phase displacement from the neutral or zero position. The generators are so designed that, with the pointers of all machines on the zero marking, the zero of fundamental voltage wave will coincide with a zero on the voltage wave of each harmonic generator. Thus, by releasing a locking screw and turning the moving-mechanism handle, the phase position of each harmonic generator may be easily shifted with respect to the fundamental generator.

The harmonic generators can be furnished as a complete set, with fundamental, 2nd, 3rd, 5th and 7th harmonic generators; or as individual units, so designed that they may be coupled to each other.



RECTIFIER PRINCIPLES MADE EASY

Rectifier panels are so designed as to permit the use of different types of vacuum tubes, thereby demonstrating either simple rectifier action or grid-control action. When such a unit is used with additional panels of similar construction, the characteristics of a polyphase unit can be clearly and easily illustrated.

In addition, there is available an auxiliary panel for use with the single-phase rectifier which will illustrate time-delay cathode protection and phase-shift control. Similarly, for the 3-phase rectifier, another type of auxiliary panel is obtainable which will demonstrate time-delay cathode protection.

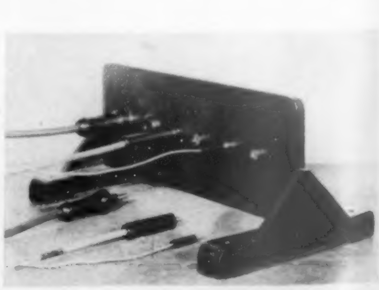
Bulletins Available on Request

Bulletin GEA-1185, illustrating and describing G-E apparatus particularly adapted to school and college laboratory use, is available on request. Also booklets on construction projects as follows:

Construction Data, ¼-hp. Single-phase Induction Motor, GEA-3514.
Construction Data, ½-hp. Three-phase Induction Motor, GEA-3542.
Construction Data, ⅓-hp. Single-Phase Induction Motor, GEA-3526.
Construction Data, 250-watt-volt d-c Generator, GEA-2289.
Construction Data, Transformer Rated Natural Draft 60-cycles, 1½ kva.; Primary Volts, 220; Secondary Volts 55/110, GET-569.

Kits for these can be purchased from the General Electric Company.

Complete information can be obtained from our nearest sales office



Display Panel of G-E Plug Switches

WESTON ELECTRICAL INSTRUMENT CORP.

601 Frelinghuysen Avenue, Newark, N. J.

ENGINEERING AND SALES OFFICES

Albany	Chicago	Denver	Kansas City, Mo.	Minneapolis	Philadelphia	St. Louis
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Buffalo	Dallas	Jacksonville	Meriden, Conn.	New York	San Francisco	

WESTON INSTRUMENTS

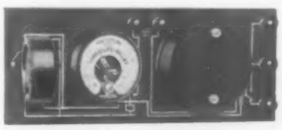
Standard for Instruction, Research, Industry

The use of WESTON instruments in educational work and scientific laboratories has become a fixed principle, for nothing short of WESTON accuracy and dependability are acceptable for engineering training. WESTON instruments are made to most exacting standards of craftsmanship and accuracy. They inspire students to be exact in experiments. And in using WESTONS in training, the student is familiarizing himself with the instruments he will use throughout his engineering career, for student graduates since 1888 have "Westonized" the industrial world. . . . Following is a condensed listing of the WESTON instruments available; also are illustrated a few of the models widely used in educational work. Complete information on all models is available in booklet form, and will gladly be sent on request.

MODEL 622

Ultra-Sensitive Microammeters, Millivoltmeters

Double pivoted type instruments for measurement of minute currents. Ideal for laboratory work and circuits involving thermocouples, pyrometers, electron tubes, etc.



MODEL 607

*** Photronic Photoelectric Relay**

Ideal to demonstrate theory and operation of photoelectric cells and sensitive relays. Consists of a WESTON Photronic Cell, a WESTON Sensitive Relay and a Power Relay mounted on a common base and wired. No outside voltage, nor troublesome amplifier required.

PORTABLE AND PANEL INDICATING INSTRUMENTS
Ammeters, Voltmeters, Wattmeters, Galvanometers, Microammeters, Ohmmeters, Microfarad Meters

INSTRUMENT TRANSFORMERS
Portable and Switchboard—Potential and Current

RELAYS
Sensitive and Power Uses—Current and Voltage Types

ELECTRIC TACHOMETERS
A.C. and D.C. Types—Remote Indicating

LABORATORY STANDARDS
Voltmeters, Ammeters, Wattmeters

SPECIALIZED TESTING EQUIPMENT
Power Analyzer, Photoelectric Potentiometer, Battery Testing Instruments

SERVICE EQUIPMENT
Tube Checkers, Analyzers, Oscillators, Ohmmeters, Vacuum Tube Voltmeters

PHOTOELECTRIC CELLS AND CONTROL DEVICES
"Photronic" Cells—Dry Disc Type

LIGHT MEASURING DEVICES
Illumination Meter, Foot Candle Meters, Sight Meter, Exposure Meters

TEMPERATURE INDICATING INSTRUMENTS
Electrical Type—Remote Indicating
Bimetallic Dial Type—Laboratory, Industrial

STANDARD CELLS

** Photronic—A registered trademark designating the photoelectric cells and photoelectric devices manufactured exclusively by the Weston Electrical Instrument Corporation.*

MODEL 525

Projection Instruments

Ideal for lecture and demonstration work. Scale can be projected to any desired size . . . seen from any room position. Available in A.C. and D.C. scale . . . also with standard scales for all needs.

MODEL 430

Portable, Precision A.C. and D.C. Instruments

Universally used in schools and industry wherever rugged, portable instruments are required for general testing. Hand calibrated, mirror scales with knife-edged pointers.

MODEL 703

Direct-reading Illumination Meters

Available equipped with the stable, all-glass WESTON VISCOR filter which permits direct measurement of incandescent, mercury vapor, fluorescent and all other light sources, regardless of color composition.

Built-up Test Equipment

Available as volt-ohmmeters, volt-ohm - milliammeters and other combinations. The line also includes radio tube checkers, vacuum tube voltmeters, high frequency oscillators, etc.

MODEL 375

Student Galvanometer

Widely used in school laboratories where durability and low cost rather than extreme sensitivity are requirements. Other models of medium and high sensitivity available.

MODEL 280

Miniature Precision D.C. Instruments

Convenient and practical for student use, combining miniature size and ruggedness. Size 4⅝ x 4⅝ x 1⅛ inches. Accuracy 1% . . . hand calibrated mirror scales and knife-edged pointers. Available in single and multi-range instruments.

EDISON STORAGE BATTERY

DIVISION OF THOMAS A EDISON, INCORPORATED

West Orange, New Jersey

SALES OFFICES IN THE FOLLOWING CITIES

Boston, Buffalo, Washington, Cleveland, Detroit, St. Louis, San Francisco, New York, Philadelphia, Pittsburgh, Cincinnati, Chicago, Seattle, Denver, Los Angeles

EDISON NICKEL-IRON-ALKALINE STORAGE BATTERIES FOR SCHOOL AND COLLEGE LABORATORY USE

EDISON Nickel-Iron-Alkaline Storage Batteries for school and college laboratories have two important advantages:

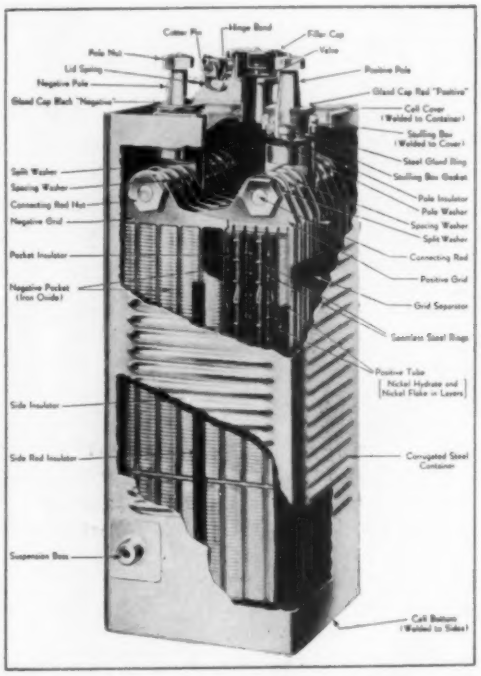
1. They are the most dependable and convenient source of d.c. for laboratory supply circuits.
2. They are the most extensively used type of storage battery in industry and hence the type with which the student is most likely to be concerned following graduation.

For D.C. Laboratory Supply Circuits

The Edison Nickel-Iron-Alkaline Storage Battery as a source of d.c. for laboratory supply circuits affords a dependability no other type of battery can approach. Use of steel for all structural parts combined with an alkaline electrolyte (which is a recognized preservative of steel) makes it practically indestructible and permits secure retention of all active materials within the plates.

Its charge and discharge results in the simple transfer of oxygen from one plate to the other. The fact that neither oxidation nor reduction, once completed, can be followed by further or other reactions, helps explain why it cannot be injured by overcharge, overdischarge, charge in reverse or other so-called electrical accidents.

These are some of the reasons for its great dependability, as well as its long life (2 to 5 times that of other batteries). Despite its higher first cost, it is the most economical battery to use.



Because of its all-steel cell construction the Edison Nickel-Iron-Alkaline Battery is the most durable made

A feature of especial value in school and college work is its ability to stand discharged during all vacation periods without need of attention and without suffering injury or deterioration of any kind.

Another feature is the convenience of using any number of cells in a battery assembly to vary the voltage as desired. This may result in unequal discharge and subsequently in overcharge of some cells when the assembly as a whole is recharged. Unlike other batteries, however, the Edison Nickel-Iron-Alkaline Battery is not injured by such treatment.

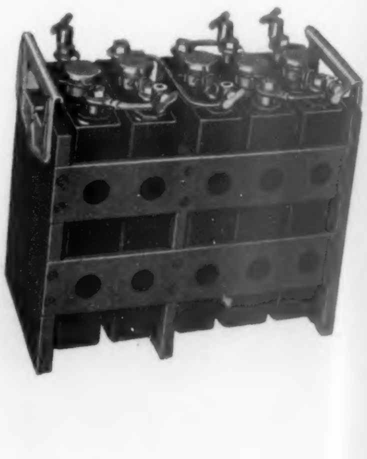
As a Means of Training in Industrial Battery Applications

Practically every major industry in the United States uses battery industrial trucks for plant transportation and material handling.

Subways and other electrified railways use storage batteries for control purposes on locomotives and multiple unit cars. Mine locomotives, miner's electric cap lamps, ship's electric power stand-by, steam railway passenger car lighting and air conditioning are other important industrial storage battery applications. In all such services, Edison Nickel-Iron-Alkaline Storage Batteries are the type in most extensive use.

Instruction in their care, operation and construction is thus of very practical value to the student.

Typical stationary laboratory battery; consists of 100 A4H cells having a capacity of 150 ampere hours; through a switchboard the output of any number of cells is made available for experiments requiring variable direct current potentials



Typical portable laboratory battery; consists of 5 B2H cells having a capacity of 37.5 ampere hours; note special taps, supplied at no additional cost with this type of cell, which permit ready use of output of variable number of cells

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, Philadelphia, Pa.

Atlanta, Ga., 210 Walker St., S. W.
Boston, Mass., 100 Ashford St.
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Cincinnati, Ohio, 718-19 Temple Bar Bldg.
Cleveland, Ohio, 6400 Hermann Ave., N. W.
Dallas, Texas, 1118 Jackson St.

Denver, Colo., 810 14th St.
Detroit, Mich., 8051 W. Chicago Blvd.
Kansas City, Mo., 129 Belmont Blvd.
Los Angeles, 1043 S. Grand Ave.
Minneapolis, Minn., 617 Washington Ave., N.
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New York, N. Y., 23-31 W. 43rd St.

Philadelphia, Allegheny Ave. and 19th St.
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Seattle, Wash., 1919 Smith Tower Bldg.
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FOR
**LABORATORIES
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AUTO-CALL**

Exide
BATTERIES

FOR
**AUTOMATIC AND
INSTANTANEOUS
EMERGENCY LIGHT
AND POWER**
See Page 140

Exide Batteries, the product of The Electric Storage Battery Company, are extensively used in the laboratories of the nation's foremost scientists, industrial research engineers, schools and colleges. Their performance records are the best testimony that can be offered as to their merit for laboratory services. The foremost characteristics of Exide Batteries are absolute dependability and sustained high voltage until end of discharge.

An Exide Chloride Laboratory Battery Cell Cut-away to Show Unique and Sturdy Construction, Sealed Glass Jar Assembly

Flexibility

The operation of an Exide Battery is flexible. Cell connections to the battery can be arranged so as to give any desired voltage, with a wide range in discharge rates available at that voltage. By assigning a group of cells of the battery to a definite experiment, a constant voltage is assured which is free from disturbance or interference by any outside influence.

Improved Design Simplifies Maintenance

Exide Batteries of the sealed glass jar type have been carefully designed and are carefully constructed for laboratory service. A deep sediment space is provided at the bottom of each cell. Posts and connections are adequate for extremely high discharge rates and inter-cell connectors are of copper heavily coated with lead.

The structural details of Exide Batteries assembled in sealed glass jars have been so refined as to eliminate all maintenance attention other than recharging and an occasional addition of water, which, with automatic cell fillers, becomes a simple task.

Long Life

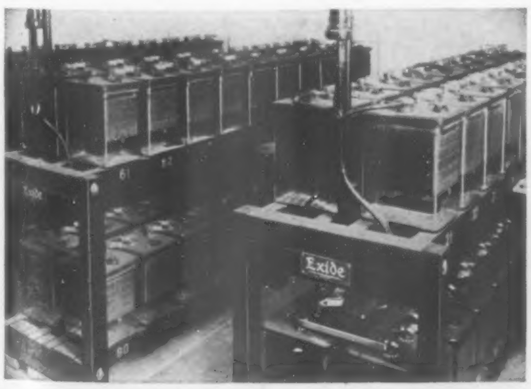
Exide Batteries are not only noted for their long life in laboratory service, but also in *all* types of industrial stationary service. *There are Exide-Chloride Batteries in laboratory and industrial installations which have been in constant use for 20 years and longer.*

For Any Budget

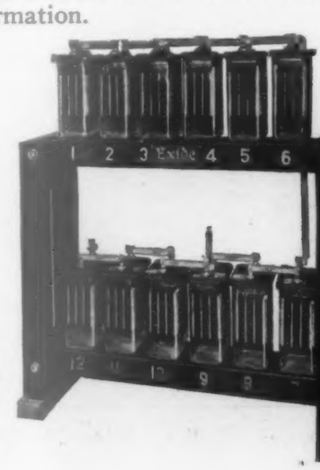
Regardless of how limited your budget appropriation, an Exide Battery can be selected to meet your requirements. They are available in a wide range of sizes and capacities, and can be installed so that cells may be added subsequently to obtain greater capacity.

Nation-wide Organization

We are prepared and equipped to help you with any laboratory battery problem which may present itself. The wide experience of Exide engineers and the services of our nation-wide Exide organization are at your disposal. Write to the nearest Exide office shown above for further information.



The Exide Chloride Battery in The Research Laboratory of Physics, Harvard University. It is Used for General Service Where Various Potentials from 2 Volts to 240 Volts Are Required



A Typical 12 Cell Exide Chloride Battery Widely Used in School and College Laboratory Work

SECTION XI
SHOP PLANNING AND EQUIPMENT

A NEW VOCATIONAL AND ADULT SCHOOL

By JOHN B. COLEMAN and **W. F. OPPERMANN**

Director* — Coordinator

La Crosse, Wis., Vocational and Adult Schools

THE school plant built for adult education results in design that is different. Such design has grown out of years of experience of adult educators. It is a departure from the traditional school building with seats and desks screwed to the floor.

The new Vocational and Adult School building at La Crosse is made up of a former Vocational School building remodeled and an addition which more than doubles the original floor space. The plant is completely new in the sense that the old structure was remodeled to fit in with the design for a complete new building.

La Crosse is a city of 40,000 people. Out of this population, 4,000 adults have attended evening schools every year for a decade. Twelve hundred young adults or youths attend day classes. The school began in a room of an old graded school building in 1912. It developed and grew, and today covers half a city block. Out of the experience of operating adult schools and classes in numerous buildings, La Crosse has developed a structure specifically for the service of its adult population.

Lighting

Artificial light is a first requirement for adult evening instruction. The typical day-school building, and especially those built ten or more years ago, have about enough light to enable the night watchman to find his way. The new La Crosse school uses indirect light except in mechanical shops where special installations are made to provide for both general and local light. Five-hundred-watt light bulbs are used in typing rooms and ordinary classrooms to provide 17 to 20 candlepower of light. In corridors, lighting varies from 2 to 6 candlepower. Sewing rooms, offices, drafting rooms, and bookkeeping rooms have 750-watt light bulbs and 30 candlepower light.

Natural lighting is the best obtainable with the use of large-area window glass and light walls. All blinds are Venetian. Stairways are lighted through glass-tile walls. New office partitions are of glass blocks, and in numerous instances classrooms, shops, and departmental offices have plate-glass partitions for improved lighting as well as for supervisional purposes. Classrooms have a most cheerful, buoyant atmosphere which is largely due to design and color. Window frames and door frames are in green enamel. Blackboards and bulletin boards have an aluminum trim. The whole arrangement and atmosphere is light.

Acoustical Treatment

Silence is another feature of paramount importance in an adult school building. Resilient floors of rubber tile in corridors, kitchen, cafeteria, and beauty-shop, and asphalt tile for classrooms, make for a comfortable atmosphere. Rooms and corridors are without echo. Offices and auditorium are acoustically correct, and the trades and industries section is so segregated as to eliminate noise and vibration interference from shops.

An adult school auditorium is practically a civic auditorium used by adult audiences for everything under the sun. Here people sit and listen to the finest musical talent, to speakers with national reputation, and to classical dramatics. The state's political conventions, the public forum, and the community rallies come to this auditorium, and each produces its own particular type of audience.

The new auditorium was designed for perfect acoustics. Walls have parabolic contours and acoustical treatment at the right places. The auditorium was put to immediate use. The local adult population have been there and feel gratified. "We don't care what seat we get. We can hear equally well from anywhere," is the general claim. There is no sale for reserved seats, because "every seat is a reserved seat."

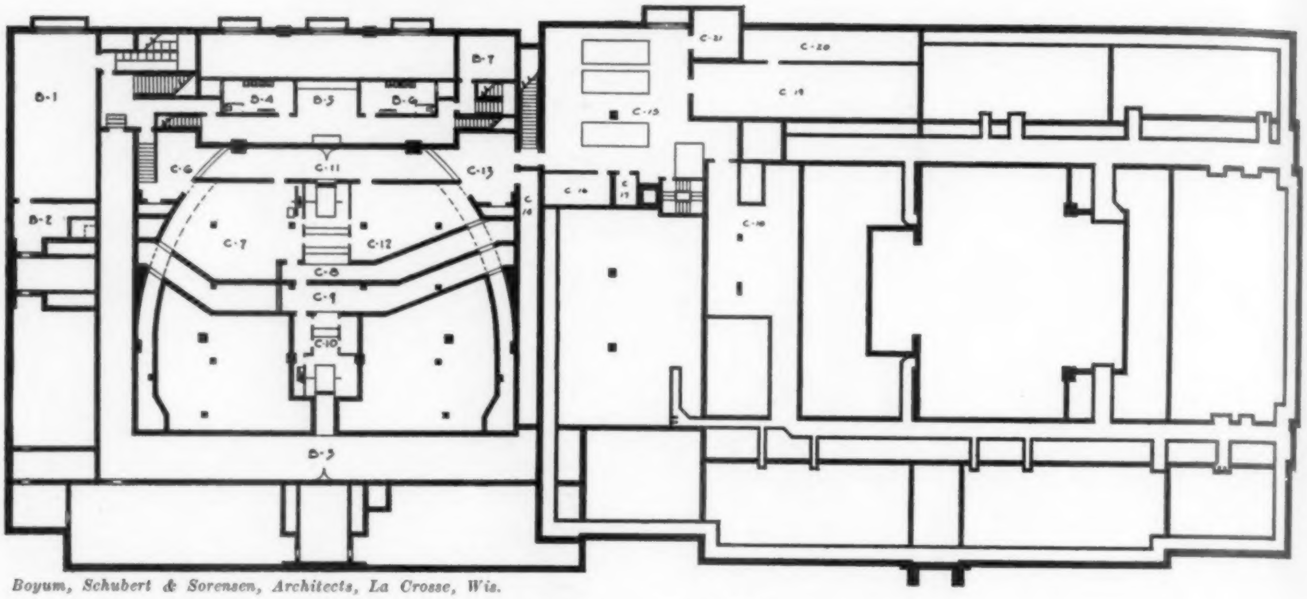
* *Editor's Note.*—Mr. Coleman also serves as educational consultant for Boyum, Schubert and Sorenson, Architects.

Right—CLOTHING ROOM
Indirectly lighted with 750-watt light bulbs, this room is readily adaptable to use for many other classes

Circle—THE LAUNDRY
The laundry is adjacent to the main clothing room

Above—LIVING ROOM
Making and planning clothing while waiting for tea in the model apartment

Right—DINING ROOM
The model apartment provides a home in which to learn homemaking



Boyum, Schubert & Sorensen, Architects, La Crosse, Wis.

Basement-Floor Plan

B-1—Bicycle parking
B-2—Incinerator room
B-3—Plenum chamber
B-4—Dressing room (men)
B-5—Make-up room
B-6—Dressing room (women)
B-7—Contactor room
C- 6—Recirculating chamber
C- 7—Air chamber
C- 8—Fresh air intake
C- 9—Fresh air intake
C-10—Classroom fan
C-11—Auditorium fan
C-12—Air chamber
C-13—Plenum chamber
C-14—Pipe chamber
C-15—Boiler room
C-16—Dry kiln
C-17—Storage
C-18—Fan room
C-19—Rifle range
C-20—Dry kiln
C-21—Shaving bin

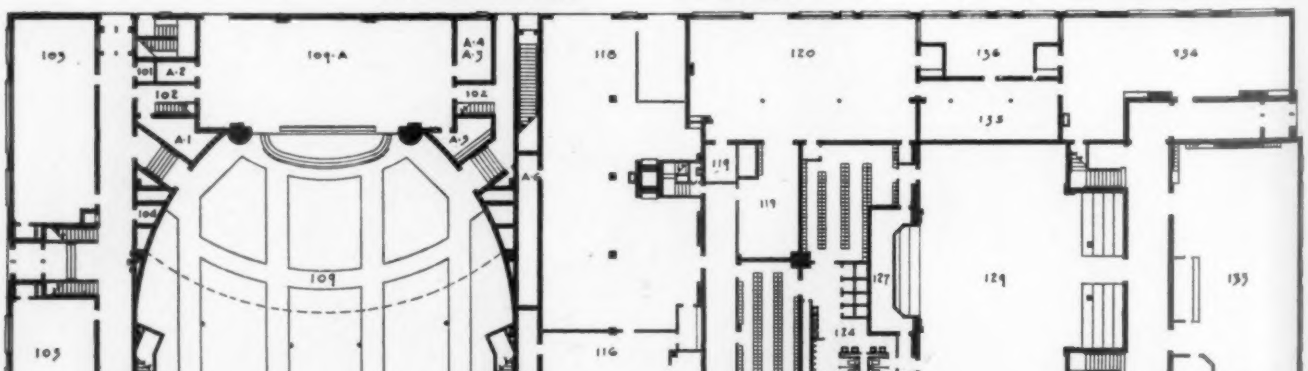
Flexibility

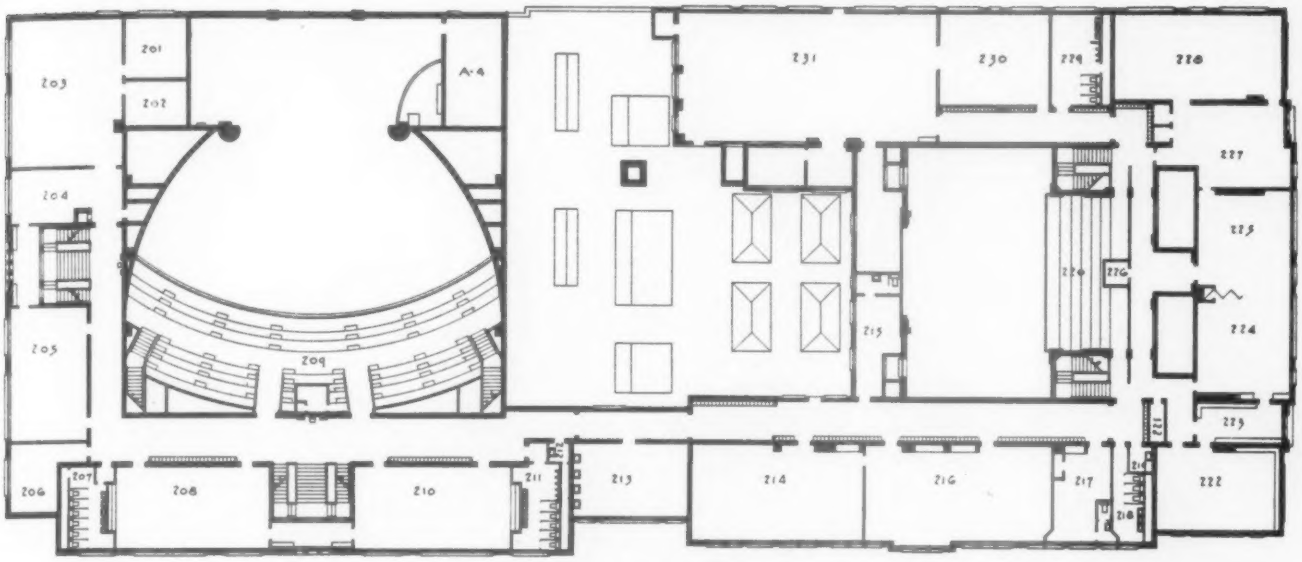
Flexibility is the big word in equipment. Adult education calls for continuous change, building and rebuilding, organizing and reorganizing. No one knows just what the next year or the next month may bring forth. One cannot count on a certain number of pupils and classes coming in from a grade below.

In the adult school, it may be necessary to use a room for bookkeeping in the morning, choir rehearsal in the afternoon, and dressmaking in the evening. A class may be on the program one month and gone the next. Even well-established classes vary in size, number and requirement year by year. For these

First-Floor Plan

A-1—Storage
A-2—Storage
A-3—Dressing room
A-4—Dressing room (above A-3)
A-5—Kitchen
A-6—Storage
101—Public telephone
102—Stage entrance
103—Bookkeeping
104—Storage
105 —Classroom
106 —Placement office
107 —Men's toilet
108 —Classroom
109 —Auditorium
109-A—Stage
110 —Director's office
111 —Private
112 —Conference
113 —Women's toilet
114 —Janitor stores
115—Lockers and showers (women)
116—Auto laboratory
117—Receiving room
118—Auto shop
119—Storage
120—Cabinet shop
121—Lockers (men)
122—General office
123—Private
124—Toilet (men)
125—Storage
126—Storage
127—Storage
128—Clinic (men)
129—Gymnasium
130—Drafting
131—Janitor stores
132—Classroom
133—Machine shop
134—Woodworking shop
135—Erecting room
136—Finishing room





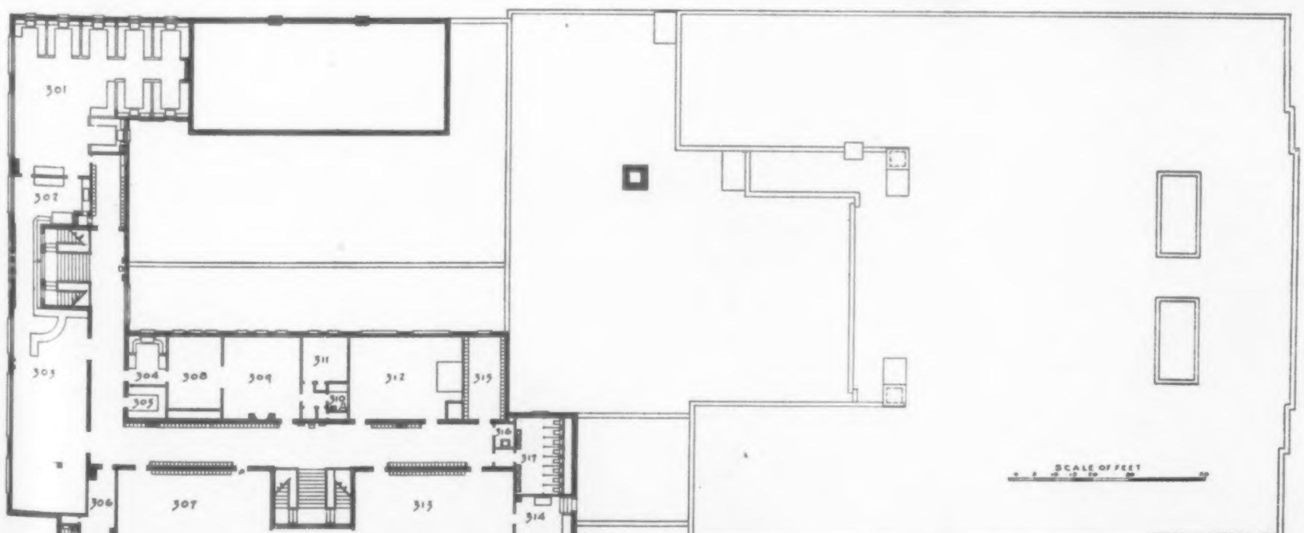
Second-Floor Plan

201—Duplicating
202—Machine dictating
203—Machine calculating
204—Comptometer
205—Shorthand
206—Commercial office
207—Toilet (women)
208—Typing
209—Auditorium balcony
210—Typing
211—Toilet (men)
212—Janitor store
213—Cosmetic art
214—Classroom
215—Men instructors
216—Classroom
217—Women instructors
218—Toilet (women)
219—Janitor stores
220—Balcony (gym)
221—Storage
222—Classroom
223—Library
224—Classroom
225—Classroom
226—Projection booth
227—Press room
228—Composing room
229—Toilet (men)
230—Class
231—General-metal shop

reasons, all furniture must be portable, and it is good practice to equip all general classrooms with tables and chairs. Tables are usually built for seating two persons. There is an aisle on each side. A room like that is readily convertible into many purposes. It may be used for a class in blueprint reading, English, mathematics, slide rule, or bookkeeping. With the addition of drawing boards, it becomes a drafting room or an art room. Add a few sewing machines and it is ready for a sewing or art needle class. Fitting wall board covers to the table tops prepares the room for a show-card or photo-tinting class. Move out the tables and put in a piano, and the set-up is ready for an orchestra or a choir. For an ordinary meeting the tables may be removed and the number of chairs greatly increased. In that way, a room regularly used for a class of 50 in bookkeeping can take care of a meeting of 200.

Third-Floor Plan

301—Unit kitchens
302—Cafeteria kitchen
303—Cafeteria
304—Apartment kitchen
305—Storage
306—Clinic (women)
307—Clothing
308—Dining room
309—Living room
310—Bath
311—Bedroom
312—Classroom
313—Clothing
314—Laundry
315—Lockers (women)
316—Janitor stores
317—Toilet (women)



The cafeteria is equipped with tables and chairs, and with a blackboard it becomes a classroom.

Two classrooms in the Trades and Industries department have been separated with an accordion door partition. When the accordion door is open and chairs are placed, the two rooms become an assembly room for the Trades and Industries or other department. The same room takes care of an afternoon meeting of the County Homemakers.

The gymnasium has a space on one side for seating players and officials. The orchestra occupies the space in case of a dance; and for a public audience it becomes the speaker's platform. The adjoining storeroom holds 400 steel folding chairs for seating an audience. Plywood panel booths, used for commercial or for school exhibits, are also in storage and can be placed on any part of the gymnasium floor. While the wrestling mats are being taken out of the gymnasium through one door, other equipment may be coming in through another entrance to prepare the place for another purpose. Electric outlets, covered with floor plates, are installed in the gymnasium floor to provide connections for electrical appliances that may be on the floor for exhibit.

The auditorium, too, is flexible. Adjoining the stage is a complete kitchen with running water, sink, cupboards, table, and electric stove. Waiting rooms and storerooms adjoin the stage, and below the stage are dressing rooms, shower rooms, and make-up rooms. A very complete lighting system, curtain equipment, scene dock, picture booth, and loudspeakers are installed. There is a permanent connection with the local broadcasting station. The orchestra pit, dressing rooms, stage and picture booths are connected with the communicating system. In short, the auditorium can readily be put to many uses for the convenience of the adult population. The cooking school may be followed by the United States Navy Band, with a motion picture assembly sandwiched in between. All facilities are on tap without interference.

An adult school is better described as an adult service station, and one never knows for what hour or for what purpose a group may request services. They may want the conference room for a small group between 5 and 6 o'clock in the evening. It may be a request for a noon luncheon meeting followed by another request for the use of the auditorium and committee rooms on Sunday afternoon. In order to comply with these requests efficiently, the building heating system is divided into various units so that certain sections may be heated individually and therefore economically. The auditorium, for example, may be heated individually when no other part of the building is used, and corridors leading to other departments may be closed with doors. Likewise, the gymnasium can be used for evening events, and corridors leading to the remainder of the building kept closed.

Mechanical shops are built a little large and equipped to be elastic. The sizes of classes will vary greatly, not only from year to year, but from month to month. The fullest use of equipment is possible, and duplication is avoided through proper construction and equipment. When classes are large, the facilities will still meet the need through the addition of an assistant instructor. When classes decrease in size, the assistant may be eliminated. It is not necessary to equip an additional shop and leave it idle much of the time. Certain types of machinery need not be duplicated in enlarging a laboratory. The addition of eight properly selected machines will double the capacity of a machine shop. The La Crosse cabinet and woodworking shops were built with an erecting room and a finishing room between. This eliminated the necessity for two such additional rooms completely equipped and supplied.

Woodworking shops, erecting room, finishing room, and cabinet shop offices are separated by large plate-glass partitions. Teachers can supervise adjoining rooms as a direct advantage of this provision. Related-work classrooms are separated from adjoining shops by glass partitions. An instructor may view the full shop from the related classroom, or the related classroom from the shop. In the machine operation department of the Commercial College, there are four rooms for housing machine calculators, comptometers, dictating machines, and duplicating machines. All rooms are separated from each other by plate-glass partitions. Commonly, a class of either 15 or 75 will use all equipment daily.

Each shop is much a department in itself with one or more instructors. Several branches of industry may be taught simultaneously within the shop. In printing, there is press work and composition. In automotive industries, there is technical tune-up work, body and fender, painting, general repair, and such automotive service as washing and greasing. The drafting department prepares students for a special employer. The general metal shop is highly diversified. Every shop department is elastic in equipment and arrangement and in the use of instructors and assistant instructors, so that it may operate at any time for the best instruction or specialization of classes, groups, and individuals.

The Homemaking Department includes foods and clothing laboratories and a suite of model home-making apartment rooms. The department occupies the entire third floor and has its toilet, locker room and clinic. The main food laboratory has a nine-unit kitchen and floor space with chairs for class assembly. The kitchen for quantity cookery adjoins the cafe-

FOODS LABORATORY
Nine unit kitchens and class assembly floor space. The brides' class meets here at 5 P.M.

BEAUTY SALON
Cosmetic arts instruction is an important part of adult education

MACHINE OPERATION SUITE
The machine calculating, comptometer, machine dictating, and duplicating rooms are separated from and connected with one another by glass partitions. Two adjoining rooms may be seen in the background

GENERAL METAL SHOP

Includes machine shop, sheet metal, forging, heat treating, electric welding, and acetylene welding. Flexible for general shop instruction or specialization

AUTOMOTIVE INDUSTRIES SHOP

Where an individual group or entire class may take specialized or general training

CABINET SHOP

Maximum use for many day and evening classes secured through adjoining facilities consisting of lumber room, unfinished projects room, tool and supply room, dry kiln and dry storage, glue room, erecting room, and supervisor's office

MACHINE SHOP
This shop will accommodate 15 or 50

BOOKKEEPING ROOM
Built for two at a table but three or four can be seated

DRAFTING ROOM
Rewired and remodeled to provide 30 candlepower indirect artificial light with use of 750-watt light bulbs

teria and the main foods laboratory. It is separated from the main laboratory by plate glass partitions. Several girls are handling the cafeteria preparation and may therefore be readily supervised by the instructor in the adjoining room.

The clothing section has two sewing rooms with a fitting room between. On one end of the main clothing room is the laundry, which has a door opening directly to the roof, where, when the weather is favorable, sunlight may be used for drying clothes. The clothing rooms are equipped with individual lockers where students may keep their work.

A new feature in home making is the model apartment or suite of home-making rooms, comprising kitchen, dining room, living room, bedroom, and bath. The living room is large and with its adjoining dining room readily takes care of an ordinary-sized class. The apartment is close to the clothing and foods laboratories, which makes it conveniently available for use in connection with regular class instruction. The homemaking apartment provides a set-up for innumerable homemaking situations. A group of girls may invite their mothers for an afternoon. In this situation the homemaking girl is hostess for reception, for tea, for entertainment, or for help with babies.

Accessibility

The La Crosse Vocational and Adult Schools building is centrally located in the community. It is situated within three blocks of the city's hotels and business district. School offices are on the first floor near the main entrance. This is a logical location for an adult institution where the school deals continuously with adults on the outside of the building as well as with those inside. The building stands on the very edge of the sidewalk, and automobiles are parked within 40 feet of the nearest auditorium seats. There are two trunk telephone lines to the switchboard. Extension lines lead to the administrative personnel, to the placement department, and to the offices of the supervisors of each instructional department. Radio broadcast is received at a central point and may be broadcast to any room or rooms. A telephone wire leads directly from the auditorium stage to the local broadcasting station. All these facilities for close community contact are essential to an adult school efficiently serving the community.

Accessibility and traffic are a problem in any building, and its first attempt toward solution lies in building design. An adult school breaks into three or four departments. At La Crosse these departments are: Trade and Industries, College of Commerce, and Homemaking. In the La Crosse building, the south end houses the Trades and Industries Department. The first two floors of the north end house the College of Commerce, and the third floor is used by the Homemaking Department. There is little need for contact between these departments. Lockers are distributed throughout the building, and toilet rooms are conveniently placed. Homemaking students enter the building at the north entrance, where the stairs lead directly to the third floor. On that floor are the lockers and toilet facilities for that department.

College of Commerce students enter the building at the entrance which leads directly to their lockers. Trades and Industries lockers and facilities are still further localized. Boys who receive instruction in any one particular shop are usually in that shop or an adjoining classroom throughout the school day. Lockers are in their classroom or immediately adjoining it.

The auditorium and gymnasium are on the street floor almost directly accessible from the sidewalk. Classrooms are built around the gymnasium and auditorium, so that the distance to these places from any classroom is very short. The auditorium is located in the north central part of the building, where it is close to 80 per cent of the students who use it. The gymnasium is used almost entirely by boys from the trades and industries shops and is located in the south center of the building surrounded by shops.

The three instructional departments have offices for their supervisors centrally located within the department. These offices have outside extension telephones, and their use is available to instructors of the department as well as to the supervisors. These telephones and other communicating systems of the school make economical use of valuable time. There is an inside telephone system connecting many rooms so as to enable instructors to communicate with one another. The communicating systems are used for business and instructional purposes only, and are economic necessities for the reason that in an adult school, departments and instructors are specialized and must cooperate in many ways with each other, with administration, and with the outside community.

The school is equipped with an inside public address system with a talk-back feature. This system puts the administrator in immediate contact with every room in the building. Announcements, radio receptions, victrola music, auditorium programs, may be directed to any room, group of rooms, or the entire building. The administrator may call a special assembly, or he may, for example, announce to all Wednesday evening classes that school will not be in session the following Wednesday owing to Thanksgiving vacation. He may speak to a teacher in a classroom and she may answer him from any part of the room. One can listen in to see if a class is in session or a shop is in operation.

THE ORGANIZATION OF TRADE TRAINING PROGRAMS IN SPECIAL SCHOOLS

By JOHN A. McCARTHY

Assistant Commissioner of Education in Charge of Vocational Education, New Jersey Department of Public Instruction

IT IS generally recognized that trade training programs should be organized for the purpose of preparing persons for a job or occupation, or of helping a person to hold a job, or of helping a person to advance on a job. This is, in general, what the vocational schools throughout the United States are attempting to do. Some of these schools give major attention to job preparation because that phase of vocational education seems to be the most important need of the area. Other schools, however, give equal attention to preparing workers for more effective performance in the fields in which they earn their living. The pre-employment programs serve the needs of youth. The job improvement and advancement courses serve the needs of adult workers.

The organization and administration of a program that is intended to prepare youth for a job or occupation is not a simple task. There must be a clear understanding of the purpose of the program, and adequate facilities must be provided to accomplish the purpose. Unless satisfactory facilities can be established, there is no sense in attempting to operate a trade training program. If the program is operated without regard to adequate facilities to achieve the objective, there will be a wastage of public funds, and disappointed youth.

The scope of the pre-employment training activities in a program of vocational education in a community, therefore, is limited by the extent to which facilities can be provided that will assist in the development of trade skills, technical knowledge, and judgments. All these must be of the types which will function in the trade or occupation.

The Training Environment

An effective pre-employment training program, however, needs other things than machines, tools, and materials. The program must be carried out in an environment that will approximate, as nearly as it is possible to approximate in a school, the conditions which will be met on the future job or in the future occupational field. It may be possible to conduct a training program under conditions that do not resemble those to be found on the job, but in cases such as these, the boy or girl will be faced with difficulties in making adjustments when a job is finally secured. An effective pre-employment program should be so organized and operated that the transfer from the school to the job will be made with the minimum amount of adjustment difficulties. The training should be such that the young worker will be able to operate under his own power with a minimum amount of supervision and direction for the employer or supervisor.

All this means that effective training depends upon a suitable training environment, and of course it also means there must be some understanding as to what constitutes the environment in a trade preparatory school. The environment means more than the room in which the instruction is to be given; it means a work-like atmosphere in which there are machines of the size and variety to be found on the job; it means working speeds and, so far as is possible, usable production that is comparable to that expected of young workers in occupational life. It means occupational situations which require performance, and conduct that will develop reliability and safety. It also means occupational situations that will give free play to the development of judgments and occupational morale.

It is difficult for the layman to describe what is involved in occupational morale, because often it is more recognizable by its absence than by its presence. It cannot be developed by precept. It requires active participation in work situations that involve accuracy, honesty, conformity with regulations, persistency, loyalty, and job pride. These are the things which constitute morale, and most people will recognize that morale is made up of ingredients of a very volatile nature—hard to develop under artificial conditions, easy to dissipate under pressures and subversive influences.

The Teacher—The Time Element

The shop teacher is by no means a minor part of the training environment. He is the one who can create or maintain the industrial atmosphere which has been described as being of such great importance. It is the teacher who directs the activities which develop morale that is regarded by some as being of greater importance for job success than is skill or knowledge. The number of persons who have these abilities and who can carry out an effective training program is not very great. Teachers in this field are not generally the product of teacher-training institu-

tions. They are recruited from occupational life because of their skill and knowledge, and they are then acquainted with the teaching tools which have been found to be effective for occupational preparation.

Many states have recognized the importance of selecting workers who have occupational experience, judgment, and viewpoints, and then subjecting them to a well-organized teacher-training program.

Another important element in a pre-employment trade training program is time. Trade skills and trade judgments cannot be developed by brief contact. Many of the skills and safety habits require conditioning through repetition. Work interests and working spans which are usually short in the early stages of training must be increased through repetition. In fact, sound conditioning practices and the development of responses that are occupationally acceptable, timely, and safe are basic in any pre-employment training program. Workers in many fields cannot stop to reflect or to recall rules of procedures; they must respond to speeds, to sounds, to signals, and in some cases to smells, in an almost automatic fashion. In some instances, to hesitate means injury or spoiled production. In these instances, to hesitate means dulled judgments and errors. We have some examples of the importance of conditioned reflexes in driving an automobile. Some of the reflexes have been conditioned through bad driving practices, and highway safety cannot be accomplished until re-training programs are established.

A sound pre-employment program for trade or occupational life cannot be carried out without some knowledge of what procedures are acceptable in the occupational field and what are not. Here, again, occupational situations must be simulated as closely as possible. There must be more time allotted than the single period of 45 minutes or the double period of 90 minutes. These are customary time allotments in industrial arts shops; they are not adequate for pre-employment training. The requirements, under the Federal acts, for at least three continuous hours of shop time were established primarily to permit the full development of job skills and judgment and job morale through exposure to job conditions in which sufficient time allotments have been provided. Those who developed this legislation saw the importance of conditioning youth to longer work experiences.

Where Is the Pre-employment Program to be Carried Out?

The requirements for pre-employment training programs which have been outlined raise the question as to the place in which the training is to be carried out. Shall this type of program be incorporated as a department of the high school, or shall separate schools be established for this purpose? Many educators have considered this question, and while there are some examples of pre-employment programs which have been incorporated in a high school, the separate trade school offers many superior advantages for trade or occupational preparation. For one thing, in the separate school, a real industrial environment can be developed and maintained with greater freedom than can be done in a vocational department in a high school. This is because the major purpose of a high school differs from the major purpose of the trade preparatory school. It cannot be expected that a vocational department in a high school which is small in comparison with other departments in the same school should influence the larger departments which are organized for college preparation or commercial fields. The small vocational department becomes so submerged that it is difficult to maintain adequate occupational contacts.

The separate trade preparatory school usually has close contacts with the occupational fields for which the training is organized. This is accomplished through trade advisory committees of employers and employees who not only tend to keep the school on its true course but who look upon the school as their responsibility and do many things directly or indirectly to maintain occupational standards. These close contacts with industrial workers and executives are fostered by the trade preparatory school personnel because they too have been selected from the same occupational fields, they talk the same language, they have the same viewpoints. These may seem to be unimportant, but they do tie the trade preparatory school into the field for which they offer training and into the field where the product is absorbed.

The ability of the separate unit trade school to maintain close industrial contacts and to maintain an industrial environment is its chief advantage. However, in some instances, when these separate schools are established within a community, it sometimes happens that they are regarded as being apart from the other schools in the system. This condition is not so prevalent today as it has been in the past, and it is the responsibility of someone in the school administration to see to it not only that these schools are a part of the entire school system but that the general public recognizes them as such.

A series of unit trade schools organized under a separate school board, as is the practice in the county vocational school systems in New Jersey, provide additional advantages. They provide a broader administrative base which lowers costs, and they make possible the opportunities for pre-employment training to residents of a larger area. Boys and girls who live in semi-rural communities of the county have

equal opportunities for occupational preparation with those who live in the larger cities.

The county systems of vocational schools accomplish the contacts with industries to an even greater degree than is possible with the separate pre-employment schools in the city systems. Geographical boundaries are expanded, and the leaders in occupational fields in the entire county look upon the several pre-employment schools in the county system as a unit group. The state-directed system of vocational schools in Connecticut serves even a wider area than do the county schools in New Jersey, and the advantage of the state system multiplies the advantages of the separate pre-employment schools that have been established in the city and county systems.

It is probable that many school districts in which pre-employment training programs are operated as special departments in the high schools may wish to continue this type of organization in the future; however, in those states in which separate schools have been operated for pre-employment purposes, the movement to expand the vocational program through separate schools is growing, and since there is also a growing interest in organizing more definite programs that will prepare youth more directly for occupational life, there is likely to be an expansion of the number of separate vocational schools in these states during the coming years.

Even the youngest children appreciate expert guidance in a shop. Here an instructor works with youngsters in the Stewart Avenue School, Garden City, New York

EQUIPMENT AND FACILITIES FOR INDUSTRIAL ARTS IN ELEMENTARY SCHOOLS

By W. VIRGIL NESTRICK

Instructor in Education, Queens College; Formerly Specialist in Industrial Arts, State Normal School, Oswego, N. Y.

THE recognition of the importance of industrial arts activities in the development of young children has given impetus to study of the requisites of good industrial arts programs in elementary schools.

A successful industrial arts program in an elementary school is dependent upon the following facilities:

1. Classrooms properly equipped to be conducive to a program of industrial arts activities
2. A shop equipped to supplement the work possible in the classroom
3. Tools and supplies necessary in the program.

Classroom Facilities for Industrial Arts

The industrial arts program cannot be considered fully developed until this work is an integral part of the work in the classroom. This implies that the classroom teacher is responsible for the planning and teaching of most of the activities. It is particularly desirable that most of the work, especially in the youngest age groups, be done in the classroom.

There are many classrooms in the schools of yesterday which are not conducive to the best work in industrial arts. An effective program demands that the school building and the classroom be planned and built to facilitate child living and learning.

Adequate proper space for the storage of supplies and of the work of the boys and girls is one of the first requisites of a successful program of industrial arts in the classroom. Lacking such space, there can be a tendency to waste materials by both children and teachers as a result of improper conditions for storing certain supplies. Classrooms may become unsightly and disorderly even under the supervision of the most conscientious teacher if ample and proper storage space is not provided.

In the construction of new buildings it is advisable to have most of the storage cabinets built in. The classroom teacher should always be consulted concerning the purposes for which the storage space is to be used. The teacher may not be a designer of cabinets nor very conscious of architectural construction, but he is more likely to know his needs than any other person. The classroom teacher or some other classroom teacher will be the one to use these cabinets,

These three photographs of an elementary schoolroom in the Whittier, Calif., school system show the remarkable progress that has been made in adapting schoolrooms to industrial arts work

Many types of industrial arts activities are carried on in these elementary school classrooms. The work-benches and woodworking tools are conveniently housed in built-in cabinets under windows when not in use

not the superintendent of schools, the members of the board of education, or the architect. This practice of consulting the classroom teacher concerning the construction of classrooms is becoming more prevalent, resulting in better understanding between school architects, the administrators, and the classroom teachers, and, as one would expect, the classrooms now being built more nearly meet the needs of the school program.

In the planning of the built-in storage cabinets along walls and under windows, special attention should be given to the dimensions of specific materials as well as the conditions under which they should be stored. A section of the storage cabinet with adjustable shelves should be provided for the storage of the various sizes of paper most generally used in classrooms. And remember: A large shelf, 22 x 40 inches, is of no value for the storing of paper 24 x 36 inches.

Small drawers which slide easily are needed in the cabinet to store nails, brads, screws and small pieces of hardware, rulers, crayons, and other staple miscellaneous supplies. Whether easels or drawing boards, or both, are used, cabinet space should be provided so that they may be stored away at those times when the maximum of space is needed for other activities in the classroom. A metal-lined cabinet for the storage of oil paints, enamels, turpentine, shellac, alcohol and other such supplies is very desirable for both cleanliness and safety.

If the necessary hand tools are to be a part of each classroom, a tool-board panel should be provided on which they may be placed at a height so that all tools can be reached by any child in the room. If it seems necessary to have some means of preventing the tools from being used or taken by persons without permission, a sliding door with lock can be provided which can be lowered over the panel when tools are not to be used. The door can be arranged to slide upward over the upper part of the cabinet when the tools are to be made accessible. The outside of the door could be either a bulletin board of cork or a blackboard.

Proper facilities for doing clay work will include a metal-lined (generally zinc) box in which moist clay can be stored and kept in working condition at all times. A section in this metal-lined cabinet or in one of the other built-in cabinets should provide for the storage of the children's clay work yet to be completed. This section or damp-box cabinet, as it is called, should also be metal-lined. The cabinet is more serviceable and more desirable if some means is provided for a constant supply of moisture. This can be done by having a 2- or 3-inch layer of plaster-of-paris saturated in water in a metal pan as the bottom shelf. Shelves in this cabinet should be adjustable to different heights to provide adequate storage of the clay objects without wasting space.

A large sink fitted with two pairs of hot- and cold-water faucets and a large drain equipped with clay and plaster trap should be standard classroom equipment. This drain and trap is very essential to prevent large plumbing bills which may result from stoppage of the drain.

The classroom should be provided with 110 volt a-c. current with electric outlets located along the wall at 10- to 15-foot intervals about 30 to 42 inches above the floor. Two or more receptacles per outlet should be provided in those areas where electricity will be used most often. As a safety device and for convenience, there should be a master switch in the room to which is connected a safety light which indicates when electric current, besides that for the lights, is being used in the classroom. This master switch and safety light should be located at the door of the classroom so that it is easily seen as the teacher leaves the room.

A two-unit gas or electric plate should be a part of the equipment of every classroom. Gas, providing a faster heat, may be considered more desirable by some teachers. If gas is provided, at least one outlet should be provided for use with a Bunsen burner. As a safety measure, an additional shut-off for each outlet should be installed at a height which cannot be easily reached by children. In this way teachers can prevent the leakage of gas into a room through a valve which has been accidentally opened by a child.

Furniture in the elementary school classroom should be well built and designed to fit active, growing boys and girls. Chairs and tables or desks should be movable. A table has been designed that has legs which fold so that when some of the tables are not needed during certain classroom activities, they may be stacked on top of each other, providing for activities requiring more floor space.[1] All furniture, tables in particular, should have finishes which will withstand repeated washings.

It is needless to say that ample light, both natural and artificial, should be provided in the classroom to prevent eyestrain in children.

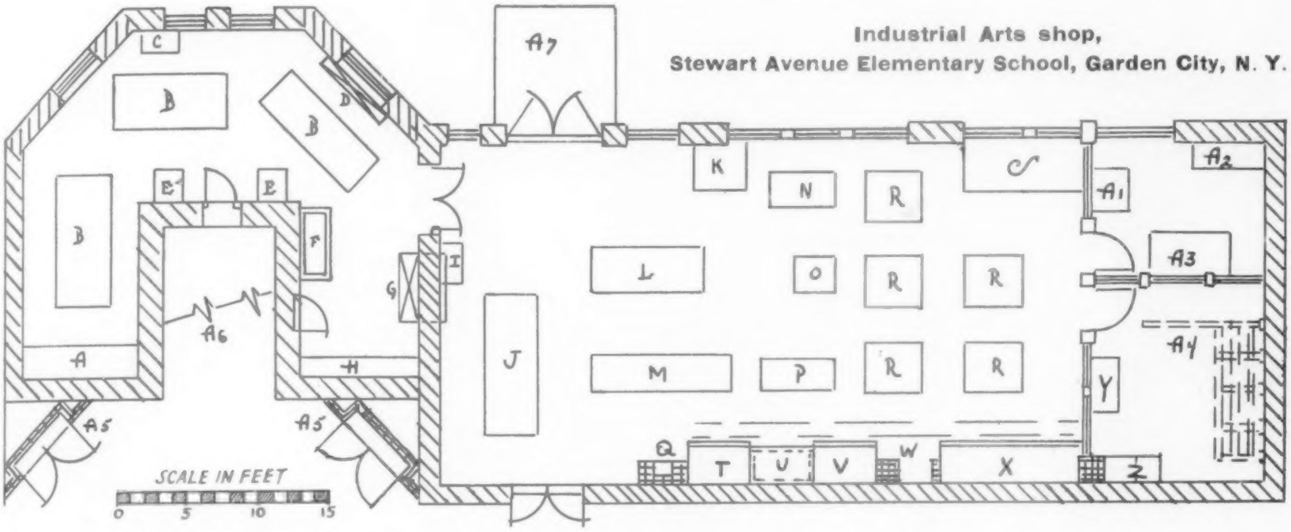
Floors should be covered with a material which is easily washable and will not stain readily.

Shop Facilities

Much of the industrial arts program of the elementary school should be an integral part of the other classroom activities. It has been stated earlier that this implies that much of the work be done in the classroom. There are certain activities, however, in

[1] These tables are in use in the Corpus Christi School, 533 West 121st Street, New York. Specifications and photographs of the tables and other pieces of school furniture designed by Dr. Roma Gans, Assistant Professor of Education, Teachers College, Columbia University, New York, can be secured from the designer.

Industrial Arts shop,
Stewart Avenue Elementary School, Garden City, N. Y.



Tooker and Marsh, Architects, New York, N. Y.

A—Damp-box for pottery
B—Work tables for clay
C—Display case for pottery
D—Potter's wheel
E—Metal-lined clay bins
H—Steel cabinet
I—Display cabinet
J—Utility work-table
K—Floor loom
L—Utility work-bench
M—Metal-working bench
N—Table for jigsaw and drill press
O—Circular saw for instructor's use
P—Squaring shears
Q—Switch-box
R—Wood-working benches, double
S—Printing equipment
T—Built-in storage cabinet
U—Tool rack and bulletin board
V—Built-in storage cabinet
X—Sink
Y—Finishing table
Z—Paint cabinet
A1—Library table
A2—Bookcases
A3—Instructor's desk and file
A4—Rack for lumber and composition board
A5—Display cabinets in octagonal entrance hall
A6—Stairs
A7—Delivery entrance to shop

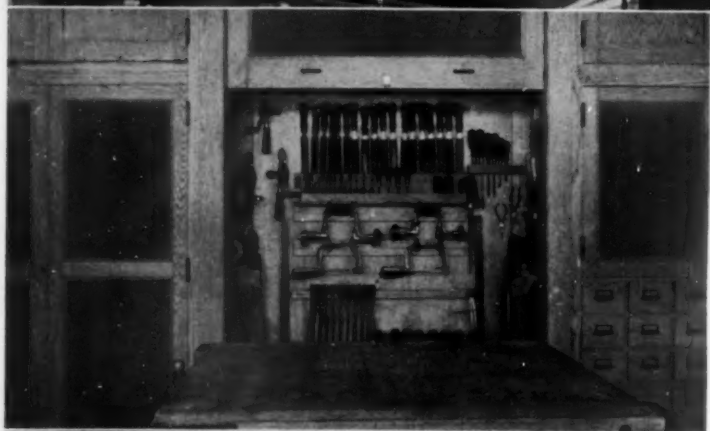
every age group, and particularly with the older groups, that require tools and equipment which it is impractical to provide in every classroom. There are some specialized activities in the industrial arts program and in the club program which can be carried on in a shop but not in a regular classroom. Educators, recognizing these needs, are having plans drawn for the industrial arts shop in their new elementary school buildings.

Elementary school shops need careful thought and planning. They are new ventures for the educator as well as for the architect. It is true that a few principles of shop planning used in junior and senior high schools and even in vocational schools can be used in planning the elementary school shop. It would be ridiculous, however, to pattern shops for industrial arts activities for children from five to twelve years of age after shops designed for older children or adults. The industrial arts shop in the past has more often been found in a basement or subbasement than in any other place in the building. In recent years, however, it has been located in more desirable places. Suggestions have been made that the industrial arts shop be located as near the center of the building as possible, since it serves the whole school and represents the center of interest of the children.

A shop serving elementary children should be easily accessible for the different groups in the building. It should be well lighted and ventilated. A room with two or three outside walls makes a delightful place in which to work, providing an abundance of natural light. With two or three walls of the room filled with windows, the wall space for built-in storage cabinets, blackboard, bulletin boards, projection screen and display cabinets has been lessened to the extent that there must be ingenuity on the part of the architect to provide this necessary space elsewhere in the room.

One generous-sized room, 35 x 60 feet, or larger, is better than two or more smaller rooms totaling the same size working area. This provides a working area for each of the different types of activities to be pursued by the children in one room, making it much easier for a teacher to give adequate guidance in a variety of activities at the same time.

There are several modifications of this one-room plan in practice. In one school, a shop might be found organized under a guild system and divided into sections or compartments for the different unit activities such as clay work, leather work, wood work, and printing and book binding. These sections or guilds are separated by low partitions or railings. There are two other variations of this type. In one, the partitions are of either wire or glass, forming a unit of a cage-like appearance. In the other, there are no partitions but, instead, the tools and equipment used in a particular type of work are located in close proximity, thereby centering this particular activity in a definite area. The wire or glass cage does not seem to possess advantages enough to offset the cost of installation, the jail-like appearance, and the problems of supervision which are found in this arrangement.



Every shop should have ample storage space. This principle was borne in mind by those responsible for the layout of the industrial arts shop at the Stewart Avenue School, Garden City, N. Y., as these four photographs show

Above—Tools conveniently stored in easy reach of young children

Left—Bins must be provided for storage of textile materials

Left—Ample storage space provided for staple hardware items

The concentration of tools, equipment and supplies used in a particular type of activity, however, seems to be a logical arrangement and is an aid in giving instruction in a variety of activities at the same time.

When the one-room plan is used, care must be exercised in arranging the shop layout so that the materials used in adjacent areas do not create problems of instruction, sanitation, or safety. It would be unsafe to place the painting area of the woodworking division near the food or cooking area. Likewise, locating the cooking or food area near the clay work is unwise, since it would lead to problems of cleanliness and sanitation which could be avoided by a different arrangement. Clay work creates a problem in the cleanliness of any shop, and for this reason some instructors prefer to have this area in an adjacent room arranged for easy supervision or at the end of the shop, separated from the other part by some special enclosure.

The floor of the clay working area is seldom clean unless it is washed repeatedly. For this reason, a concrete or tile floor is advisable with large floor drains so that the floor may be sprayed and flushed frequently with water. The floor under the other working areas should not be of concrete or tile, because either is very tiring for the children and for the instructor, who stand on the floor for hours each day. If wood is used, it should be of hardwood, preferably maple. A linoleum floor covering is easily cleaned and does not tire one who must stand on it for many hours at a time.

The shop should have a large amount of storage space. In general, the built-in cabinets should be similar to those described for the classroom except that they must provide for the storage of a greater variety of materials and for larger quantities. Specially constructed cedar-lined, moth-proof and mouse-proof bins and cupboards should be provided for yarns, roving and other textile materials. A metal-lined clay storage cabinet and damp-box, as described for the classroom except larger, should be provided in the shop. Racks for the storage of lumber and composition board should be provided in the shop layout.

There should be large cabinets, glass-enclosed, with cork-board backs for a display of children's work and for special displays of other visual instructional materials. Built-in glass-enclosed display cabinets in the walls of the hall adjacent to the shop, electrically lighted, filled with the work of the children, are instrumental in publicizing the industrial arts program to parents and visitors and in increasing child interest in this work.

Many shipments of supplies such as lumber, metals, clay, tools and equipment which are delivered to the school weigh several hundred pounds. In the cause of efficiency and the saving of unnecessary labor, it is convenient to have a door in the outside wall of the shop, wide enough for a truck to make delivery directly to the floor of the shop. This arrangement necessitates the planning of a driveway on the grounds leading to this door.

Storage space is always at a premium in connection with a school shop. If possible, it is advisable to have a storage room adjacent to the shop in addition to the storage space in the shop.

Every shop should have an area reserved for the storage and use of reference materials. This area should include cases for books, filing cabinets for pamphlets and other illustrative material, along with cases for special exhibits. In addition, another area should be reserved for the instructor's private desk and file. A very practical arrangement is to have these two areas combined in a glass enclosure across one end of the room. This provides a room where children may be reading reference material undisturbed while some other group is working in another part of the shop.

Tools and Supplies

The tools and supplies in both the classroom and the shop should be of the type which will aid in achieving the specific objectives of the industrial arts program in the particular school in question. Long lists could be compiled of tools and equipment which are in use in many elementary schools, but these tools and equipment might not be in harmony with the objectives of industrial arts in other schools. Aid in the selection of tools and equipment can be found in various books on industrial arts.[2]

Undoubtedly there are many other arrangements of facilities for industrial arts in elementary schools which have proved to be more or less satisfactory. Many schools have small washrooms in connection with each classroom. Other schools have small workrooms between two adjacent rooms. The recommendations made in this article are based on facilities found in some of the better elementary schools.

When new buildings are built, careful consideration should be given to the foregoing recommendations. The facilities in the new building should be critically evaluated continually, so that recommendations based on experience can be passed on to others who may be building new elementary schools.

[2] a. Bonser, Frederick G., and Mossman, Lois C.: "Industrial Arts for Elementary Schools." Macmillan, 1927.
b. Knox, Rose B.: "School Activities and Equipment." Houghton Mifflin, 1927.
c. Newkirk, Louis V.: "Integrated Handwork for Elementary Schools." Silver Burdett, 1940.

STANLEY ELECTRIC TOOL DIVISION

THE STANLEY WORKS

New Britain, Connecticut

STANLEY
"VICTOR" DRILL
No. 124—½" Capacity

A most practical size electric drill for the School Shop. Round shank twist drills and bits, hole saws, countersinks, plug cutters, etc., can be held in this three-jaw geared chuck. Complete line of electric drills, sizes $\frac{3}{16}$" up to ⅞".

DRILL STANDS

There is a Stanley Drill Stand available for any Stanley Electric Drill. They make a practical combination for the School Shop.

HAND ROUTER
No. 10
18,000 R. P.M.

Adds the professional touch to projects. High speed produces smooth work—sanding practically unnecessary. It will perform countless woodworking operations — shaping, inlay work, routing, templet work, veining, relief work, grooving, rabbeting, corner beading. Bench Stands and Attachments available for converting to a spindle shaper.

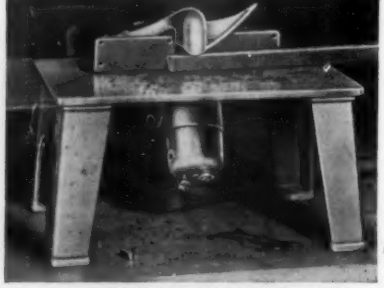


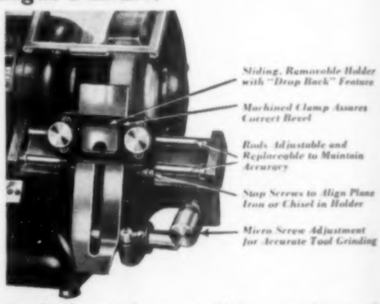
TABLE SHAPER
No. 41

Uses same Motor Unit as Router No. 10. Table has patented motor holder that tilts to 45°. By rearranging 2 or more different cutters on the spindle and by changing angle of motor unit, a wide variety of shaping cuts can be obtained. Steel table top is 12" x 18" x ⅜" on 8⅞" gray iron legs.

EDGE TOOL GRINDER
No. 667

Ideal for the School Shop. Ball bearing, 7" x 1" wheels — one wheel specially designed for edge tool grinding, one wheel for general purpose grinding. Motor operates at slow speed. Equipment includes Plane Iron and Chisel Grinding Fixture, Safety Eye Shields, Adjustable Light Fixture.

PLANE IRON AND CHISEL GRINDING FIXTURE
No. 568

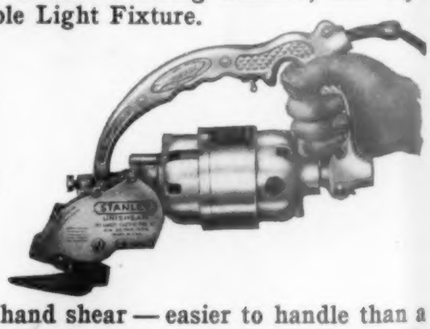


Designed to keep edge tools in perfect condition easily and accurately. Furnished with Nos. 667 and 667E Grinders

COMBINATION GRINDER AND SANDER
No. 667E

Ball bearing. Special wheel for edge tool grinding, 7" x 1", 8" sander plate. Sanding discs available for wood or metal work. Motor operates at low speed. Complete with Sanding Plate and a Mounted Disc, Plane Iron and Chisel Grinding Fixture, one Eye Shield, Adjustable Light Fixture.

"MIGHTY MIDGET" UNISHEAR



Motor driven hand shear — easier to handle than a pair of snips. Cuts 18 gauge hot rolled steel or galvanized iron as fast as you can feed it. Cuts large sheets or small pieces easily. 100% safe.

Write for catalog on Stanley Electric Tools and the Stanley Router and Shaper for School Shops.

STANLEY TOOLS

EDUCATIONAL DEPARTMENT

New Britain, Conn.

STANLEY "Boy Proof" TOOLS

FOR WOODWORKING AND FARM SHOPS • ELECTRICAL SHOPS • FORGE SHOPS SHEET METAL SHOPS • AUTOMOBILE SHOPS • MACHINE SHOPS

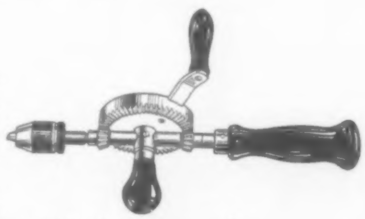
No. 52½ 10 Oz. HAMMER

Super heat treated head. Evertite oil treated handle of selected straight grain hickory. Patented wedges.

No. R40 EVERLASTING CHISEL

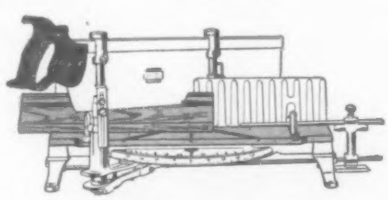
No lost or battered handles. Rubber composition handle, practically unbreakable, moulded about shank. Blade, shank and head one piece of finest steel.

No. 617 HAND DRILL



New chuck with hairpin type springs. Heavy crank, solid wheel, several other important features. ¼" chuck capacity. Hand Drill No. 626 has ⅜" chuck capacity.

No. 2246 MITRE BOX

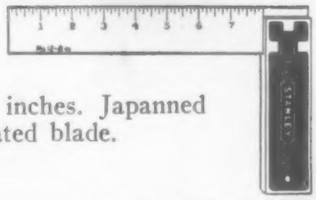


Simplified design. Swivel and uprights one piece of malleable iron. Malleable iron saw guides with roller bearings.

No. 80M SCRAPER

Practically unbreakable. Body and handles one piece of malleable iron.

No. 12 TRY SQUARE

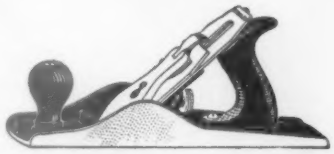


Graduated in eighths of inches. Japanned finish handles. Nickel-plated blade.

No. 34½V BOX-WOOD RULE

Improved vertical figures—easy to read in any position. One side graduated in eighths of inches—other side in sixteenths. Brass tips protect ends.

No. 5¼ JUNIOR JACK

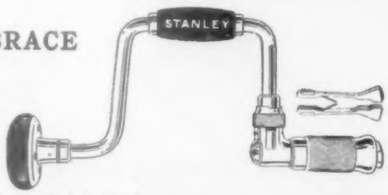


Well balanced, lightweight. Ideal size for Junior High School student.

No. 118 BLOCK PLANE

All steel. Minimum number of parts. Lowest cutting angle.

No. 919 BIT BRACE



Self - centering chuck, all parts locked in place. Bronze bushed ball bearing head. Made with 8, 10, 12 and 14 inch sweep.

No. 20 SCREW DRIVER

Standard blade. Blade, shank and head hot forged from one piece of steel.

No. 340 SOLDERING IRON

Electric—95 watts. Pure copper tip. Hermetically sealed heating unit. Hardwood, adjustable handle.

•

SEND FOR SPECIAL SCHOOL CATALOG NO. 34

Catalog 34, in its 240 pages, contains much useful material in addition to complete descriptions and specifications on Stanley Tools. Get your copy free and use it as a handbook for tools and their use.

* * * * * * *

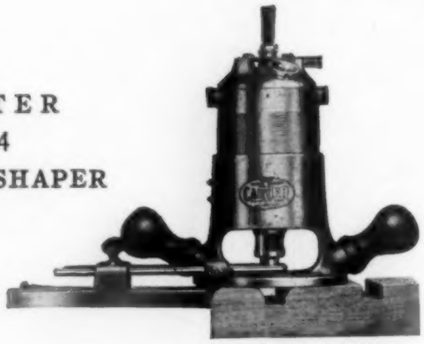
Write for Information on STANLEY VISUAL TEACHING AIDS

THE R. L. CARTER DIVISION

THE STANLEY WORKS

New Britain, Connecticut

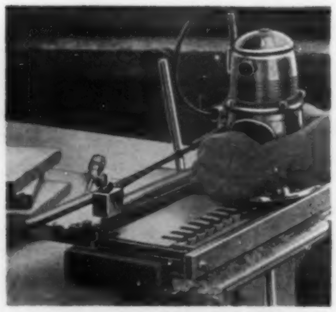
CARTER RS4 ROUTER-SHAPER



This portable electric machine will enable students to finish their projects with a professional touch. With a chuck for bits, it's a Router and can be used for rabbet and dado cuts, inlay work and veining. With an arbor, for cutters, it's a Shaper and can be used to make hundreds of shaping and decorative molding cuts. In addition it can be used with many attachments, some of which are described below.

3/4 H. P. universal motor turns 18,000 R. P. M. Safe, accurate depth adjustment to 1/100th of an inch. Motor housing made of strong aluminum alloy. Priced low enough for the smallest shop.

ATTACHMENTS FOR RS4 UNIT



Dovetail Fixture

With the Carter RS4 Router-Shaper, this Dovetail Fixture guides the bit in making both blind and open dovetails. A single pass across the work completes at one time, the two pieces of any joint up to 13" in width. Average cutting time for the two pieces—**one minute!**

Beading and fluting is an easy operation to perform with absolute safety with Carter equipment. Work may be held in a lathe or by Carter indexing centers, which assure equal spacing. The motor is simply turned up or down to the correct height, then pushed against and along the work. A guide fastened to the end shield of the motor, regulates depth of cut, but does not revolve and so cannot burn the work.

Beading and Fluting Attachment

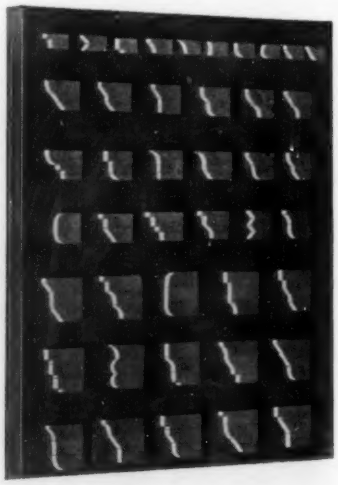
Carter RS4 motor unit can be used in a Shaper Table for a wide variety of decorative molding cuts. Motor unit may also be mounted horizontally on a bench for carving small or large pieces.

CARTER C51 BENCH SHAPER

1 H. P. universal Motor is held under the table in the Carter patented holder that can be tilted from vertical position to any angle up to 45°. The motor spindle projects through the table top and holds one or more cutters. By using a few cutters singly or in combination and by tilting the motor to various angles many different shaping cuts can be made.

Cut-away View of Patented Tilting Feature

Machined steel table top measures 16" x 26". Table is drilled to accommodate straight fence, tension shoe, light fixture and circular guide. A hold down, with spring tension fastens on the straight fence.



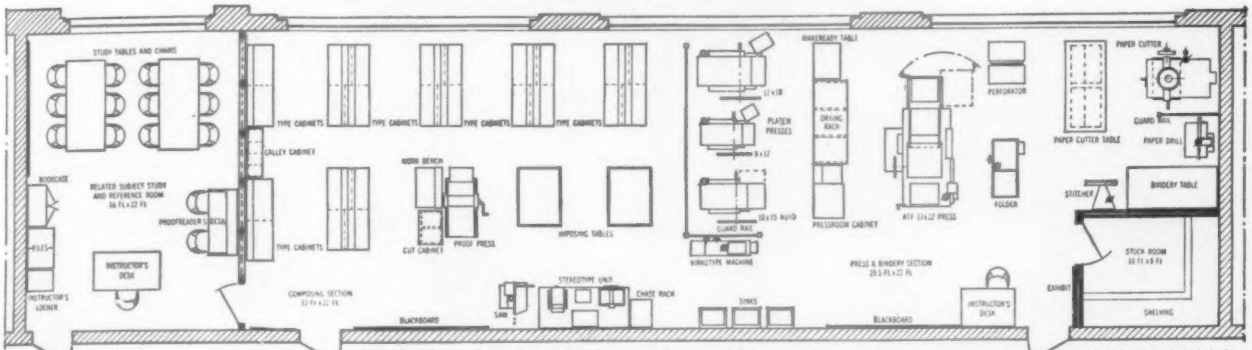
MOLDING CUTS MADE WITH CARTER C51 SHAPER

The cuts shown here were made with one cutter or in combinations of two or three cutters. It is possible to make hundreds of different molding cuts on the C51 because of the patented tilting spindle feature. The spindle can be tilted backward up to 45° and forward to 25°. This feature will save you the expense of purchasing special cutters for every job.

AMERICAN TYPE FOUNDERS

DEPARTMENT OF EDUCATION

200 Elmora Avenue, Elizabeth, N. J.



The ideal layout for trade training classes to take care of 24 to 32 students. The approximate room size, 22x72 feet. This is only one of the many School Printshop layouts ATF is prepared to furnish.

ATF School Printing Units

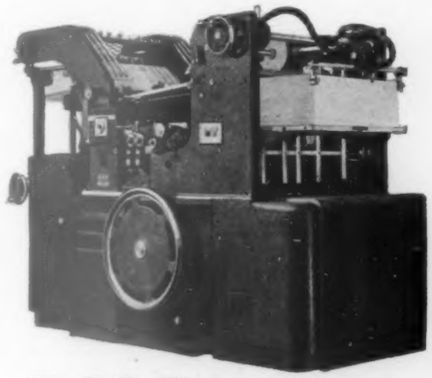
- *These are only a few pieces*
- *in the large assortment*
- *of ATF school printshop*
- *equipment. Send for list.*

American Type Founders maintains an experienced staff of engineers who will be glad to furnish, without cost, a layout for the school printing unit that best suits your needs. Their services are also available in the planning of your department, or in solving any difficulties in the layout and organization of your printshop, and in the selection of the equipment you will use. Don't hesitate to avail yourself of this service. There is absolutely no cost or obligation. Just write on your letterhead to

American Type Founders

No. 099 Vandercook Proof Press

Accurate, rigid and accessible. Ideal for all hand inking work on 14x18 inch printing surface.



The Kelly Clipper

New efficient, automatic cylinder press that takes a 13½x20 inch maximum sheet...latest addition to the distinguished Kelly line. Ideal in size for the up-to-date trade training class.

Boston Wire Stitcher

Handles work up to ½ inch in thickness. Easily arranged for saddle or flat stitching. A safe, efficient machine for the average shop. Also power stitchers in all sizes for the larger units.

New Series C&P Platen Press

3 sizes—8x12, 10x15, 12x18. Equipped with latest, improved safety devices. Adequate for all purposes in junior and senior high school printing units.

Double-tier Wall Type Cabinet

Provides easy access to all compartments of type cases. Large working surface that takes full size working galleys. Lifetime, all steel construction, olive green finish.

No. 265 Challenge Lever Paper Cutter

Safe, easy to operate, and thoroughly dependable. The same efficient equipment used in many commercial plants all over the country. Heavy construction insures lifelong service.

THE BLACK & DECKER MFG. CO.

Towson, Maryland

BRANCHES IN

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ELECTRIC TOOL HEADQUARTERS

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New Orleans
Newark
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Oakland
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Pittsburgh
San Francisco
Seattle

HOLGUN ELECTRIC DRILL

An all-purpose drill—perfectly balanced, perfectly proportioned, of surprising compactness and smooth, rugged power for heavy duty production work.

¼" HOLGUN

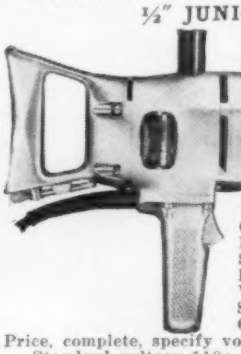
Capacity: In steel ....up to ¼"
In hardwood ....up to ½"
No load speed, 1700 R.P.M. Full load, 900 R.P.M.
Weight: Net .....2¾ lbs. Shipping ...4¼ lbs.
Overall length ....6¾" Spindle offset ... ¾"
Price, complete, specify voltage (Code No. 345) $32.50

¼" JUNIOR ELECTRIC DRILL

Designed for intermittent service in shops and for maintenance work. "Compo" oilless bearings for smooth operation. Its powerful motor will handle hundreds of "pick-up" drilling jobs in metal and wood. An ideal drill for tool kit in maintenance work, plumbing, automotive repair, electrical, carpentry and cabinet work and on the work bench.

Capacity: In steel....up to ¼" In hardwood ....up to ½"
Speed: No load.....1800 R.P.M. Full load ....1050 R.P.M.
Weight: Net ....3¾ lbs. Shipping ....5 lbs.
Overall length ....10¾"
Price, complete, specify voltage (Code No. 30) $19.95
Standard voltage 110; also available for 32, 220 or 250 volts.

½" JUNIOR ELECTRIC DRILL



A light weight tool designed for the general shop and for intermittent service in maintenance and repair work. "Compo" bearings for years of smooth service. Spindel speed ideal for driving hole saws up to 3½" capacity.

Capacity: In steel ....up to ½"
In hardwood ....up to 1"
Speed: No load ....375 R.P.M.
Full load ....240 R.P.M.
Weight: Net ....9⅝ lbs.
Shipping ....11¾ lbs.
Overall length ....14¼"
Price, complete, specify voltage (Code No. 38) $35.00
Standard voltage 110; also available for 32, 220 or 250 volts.

VACKAR ELECTRIC VACUUM CLEANER

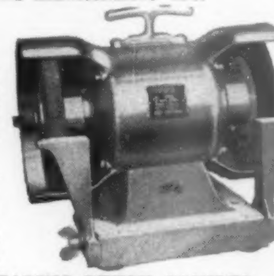
The No. 95 Vackar is a super-powered cleaner for both automotive and industrial use. With both inlet and outlet hose connections, it can be used as a vacuum cleaner or a blower. Recommended for use with the Lectro-Kleen Process as motor and mechanism are completely protected from moisture and unharmed under such use. Ideal all-purpose cleaner for heavy-duty service in garages, super-service stations, wash-racks, etc.

Dimensions: Height ....28"
Top Diam. ....16¼"
Base Diam. ....18½"
Sealed Vacuum Pull ....65"
Weight: Net ....52 lbs.
Shipping ....67 lbs.
Price, complete, specify voltage (Code No. 425) $137.50
Standard voltage 110; also available for 220 or 250 volts.

ELECTRIC BENCH GRINDERS

Black & Decker Bench Grinders now present the most complete line of quality service grinders at popular prices. There are four units ranging in size and price to meet every grinder requirement in general shop and maintenance use.

6" JUNIOR BENCH GRINDER



A full quality Black & Decker unit with ball bearings throughout, wheel guards, tool rests and convenient handle—unusually low in price.

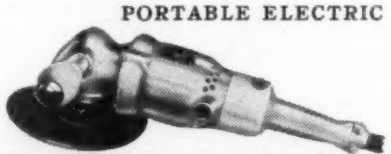
Wheel size ....6" x ⅝" x ½"
Motor rating ....¼ H.P.
Not universal
Price for all 1-phase A.C. voltages and cycles $22.50

6" HEAVY DUTY BALL BEARING BENCH GRINDER

For heavy duty service and longer life this unit is equipped with ball bearings, also enclosed wheel guards, tool rests and handle.

Wheel size ....6" x ¾" x ½"
Motor rating ....⅓ H.P.
Not universal
Price for 110 volts, 50-60 cycles,
Single phase A.C. voltages only $38.00
All D.C. voltages only 42.00

PORTABLE ELECTRIC SANDERS

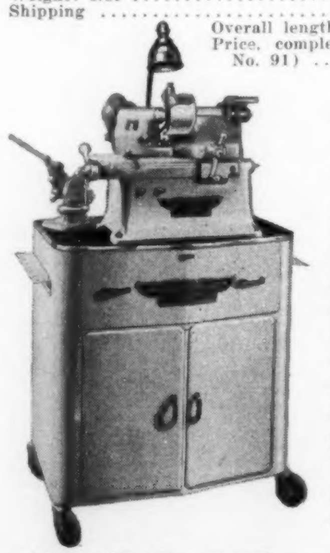


For all types of metal surfacing, Portable Electric Sanders greatly reduce operating time and produce smoother surfaces. The flexible disc adapts the unit to flat or curved surfaces.

7" JUNIOR

For intermittent service in paint shops, metal working shops and foundries. Not recommended for continuous production use.

Diameter of disc ....7"
No load speed ....3700 R.P.M.
Weight: Net ....7¾ lbs.
Shipping ....12 lbs.
Overall length (not including pad).....14¾"
Price, complete, specify voltage (Code No. 91) $39.50



ELECTRIC VALVE SHOP

This Valve Shop is the most complete "package" of precision valve reconditioning equipment on the market. It is available in eight different combinations of equipment, adapting it to the shop requirements and pocketbook of any shop doing valve work. Contains everything necessary for a complete valve job, does the work right at the car, and helps you sell valve work to your customers.

Complete line includes: Drills, Drill Stands, Hole Saws, Screwdrivers, Nut Runners, Tappers, Hammers, Saws, Glue Pot, Bench Grinders, Die Grinders, Portable Grinders, Shears, Sanders, Buffers, Vacuum Cleaners, Valve Shop, Valve Refacers, Valve Seat Grinders, Valve Lapper and Accessories. **COMPLETE CATALOG SENT ON REQUEST.**

THE LUFKIN RULE COMPANY

Saginaw, Michigan, U. S. A.

NEW YORK: 106–110 Lafayette Street

LUFKIN

PRECISION TOOLS:

- Micrometers
- Squares, Combination, etc.
- Calipers
- Dividers
- Steel Scales
- Indicators
- Protractors
- Bevels
- V Blocks
- Clamps
- Hold Downs
- Scribers
- Rules, Steel
- Punches, Center & Drive Pin
- Gages:
  - Center
  - Depth
  - Drill Grinding
  - Feeler
  - Planer
  - Radius
  - Screw Pitch
  - Shaper
  - Surface
  - Telescoping
  - Thickness
- Tool Chests
- Tool Sets, Students

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MEASURING TAPES:

- Chrome Clad Steel
- Nubian Finish Steel
- Stainless Steel
- Engineers Steel
- Surveyors Chain
- Metallic and Other Woven Tapes
- Pocket, Steel & Woven

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STEEL TAPE-RULES:

Flexible—Rigid

•

RULES:

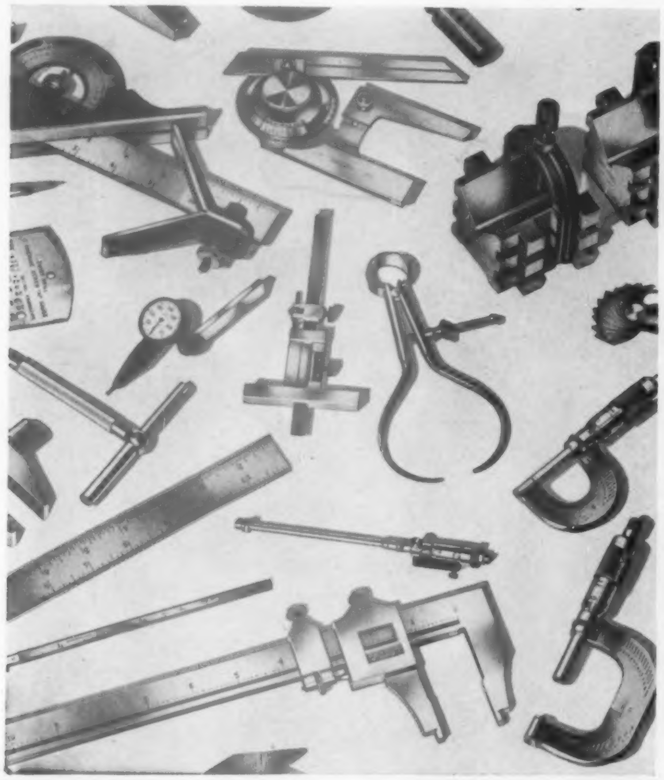
- "Red End" and Other Spring Joint
- Aluminum Folding
- Boxwood & Caliper
- Steel and Brass
- Manual Training Etc., Etc.

Send for
CATALOG OF
PRECISION TOOLS

BROWN & SHARPE MFG. CO.

Providence, R. I.

"World's Standard of Accuracy"



MACHINISTS' TOOLS

- Micrometers
- Calipers
- Verniers
- Gages
- Indicators

MILLING CUTTERS

- Plain Milling Cutters
- End Mills
- Face Mills
- Slitting Saws
- Gear Cutters
- Hobs

OTHER USEFUL SHOP EQUIPMENT

- Arbors and Collets
- Ground Flat Stock
- Surface Plates
- Magnetic Chucks
- Vises
- Pumps

Catalog of complete line on request

OLIVER MACHINERY COMPANY

Grand Rapids, Mich.

BRANCH OFFICES

50 Church Street, New York City
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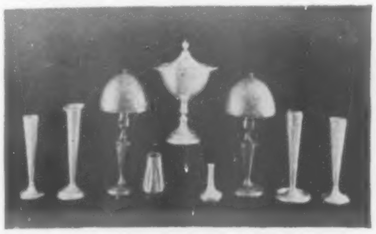
901 Bank of Commerce Building, St. Louis
221 Sexton Building, Minneapolis

METAL SPINNING DEVELOPING RAPIDLY



It is easy to learn and the art possibilities are unlimited. Ask Oliver about Metal Spinning.

Metal Spinning Lathes by Oliver have been developed to the point of Leadership in this line. Lathes are powerful. Boys love the work. Lathes can be used for wood turning also.

"OLIVER" OILSTONE TOOL GRINDERS

Junior with 6" Wheels

Every shop using edge tools should have an Oilstone Grinder.

No. 585, illustrated at right, carries two 8" Oilstone wheels, a dry grinding wheel and emery cone.

"OLIVER" CIRCULAR SAWING MACHINERY

Built in sizes from large, heavy saws to junior models. The "Oliver" No. 232D Tilting Arbor Saw Bench is illustrated. It carries 12 or 13" saws. Motor arbor. Table 33¾ x 34¾.

Other types of "Oliver" saws are Universal Saw Benches, Miter Saws, Variety Saws, Cut-off types, etc.

Important Note: It is impossible with so large a line as the "Oliver" to put specifications into such a small space. We will gladly send to inquirers specifications and literature fully describing any machines in our line.

HIGHER SHOP STANDARDS WITH "OLIVER"

Write for descriptive literature

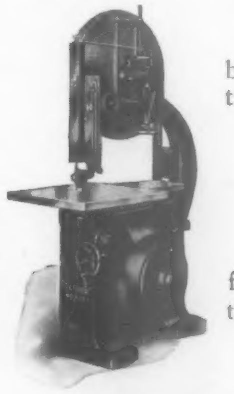
The No. 189 Hand Planer and Jointer takes its place with other "Oliver" Machines in the esteem of school shop men. The same high quality is evident in its safe, efficient and simplified features of design and the sturdy, trouble-free construction of this model. Built in two sizes, 8" and 12", to handle same width stock, respectively. Other valuable characteristics await your inspection.

The favorite equipment in school shops. Years of satisfactory service in industry preceding school shop acceptance has given "Oliver" a background of experience in providing the school shop requirements.

Special cooperation extended to school shop executives in planning and equipping woodworking shops.

"OLIVER" WOOD LATHES

are built in many types and sizes from largest pattern makers' lathes to junior sizes. No. 51, illustrated at right, is a 12" motor head speed lathe giving all speeds from 600 to 3600 r.p.m.



"OLIVER" BAND SAWS

Full line from largest high speed band saws to 18" Junior. We illustrate our popular 30-inch, No. 217.

No. 299 Surfacer is illustrated at right.

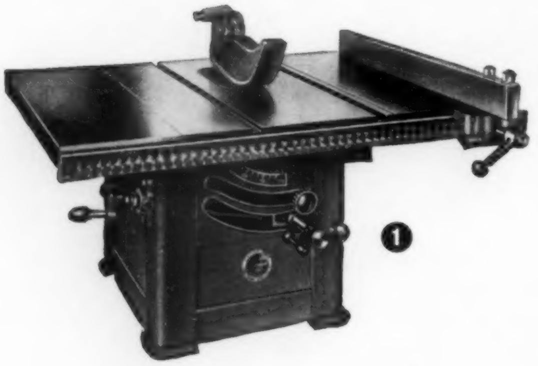
Ask for Details and Prices on "Oliver"

- Circular Saw Benches
- Band Saws
- Band Saw Brazers
- Jig Saws
- Carving Machines
- Surface Planers
- Jointers
- Wood Lathes
- Metal Spinning Lathes
- Sanders (Specify Type)
- Boring Machines
- Mortisers
- Tenoners
- Shapers
- Wood Trimmers
- Oilstone Tool Grinders
- Electric Glue Pots
- Woodworkers Vises

WALKER-TURNER COMPANY, INC.

Plainfield, N. J.

Drill Presses • Radial Drills • Band Saws • Bench Saws • Tilting Arbor Saws • Jointers • Belt and Disc Surfacers • Jig Saws • Radial Saws Spindle Shapers • Lathes • Grinders • Flexible Shaft Machines



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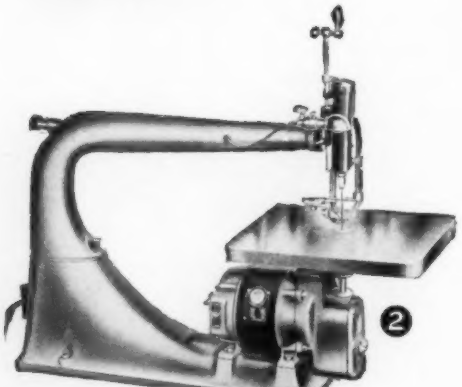
WALKER-TURNER Machine Tools meet every school requirement—safety, simplicity, accuracy, durability and economy both in first cost and in operation. Most of these machines are available in direct motor drive. Where belt drive is used, the belts are enclosed to give ample protection to the operator.

The same production line methods that have put fine motor cars within reach of the average man, enable us to produce Walker-Turner Machine Tools to high standards of material, design and construction, yet sell them for surprisingly low prices. Thousands are in daily use in industrial plants and vocational schools.



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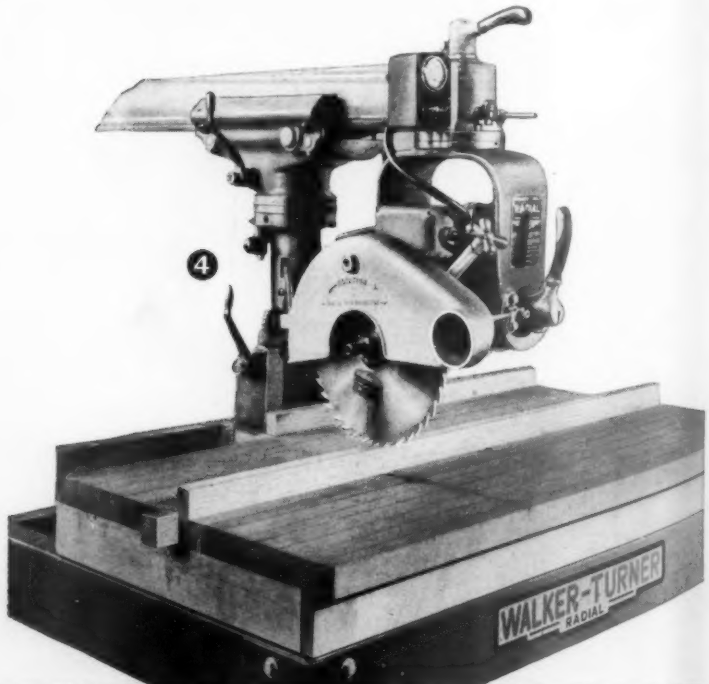

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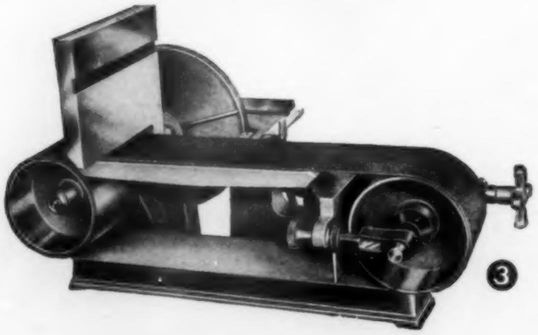

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walker-Turner
COMPANY, Inc
PLAINFIELD, N.J
U.S.A

WALKER-TURNER

DRILL PRESSES • RADIAL DRILLS • BAND SAWS • BENCH SAWS • JOINTERS SPINDLE SHAPERS • GRINDERS

1 TILTING ARBOR SAW—portable and floor models. Geared motor or Texrope Drive, fully enclosed. Unique gun type elevating mechanism that cannot be jammed.

2 JIG SAW—24" direct drive in single-speed and two-speed types. 24" 4-speed model in 600, 900, 1250 and 1740 r.p.m. Patented blade tensioner reduces blade breakage.

3 BELT & DISC SURFACER—heavy cast-iron base and tables, accurately machined. Bearings dust-sealed, packed with grease at factory, require no further attention.

4 RADIAL SAW—5 machines in 1. Does equally well — cross cutting, ripping, mitering, dadoing, shaping, routing, tenoning. New type shock-proof geared motor gets shaft so close to work that same depths of cut may be made with smaller blades than used on ordinary motors. Thus greater rim force is attainable with motor of same horse power. Cuts wood, metals, plastics, ceramics, etc., etc.

5 SPINDLE SHAPER—portable and floor models. Geared motor drive with operating spindle turning at 7600 r.p.m. Safety without loss of utility. Two precision dust-sealed ball bearings on motor shaft and two on gear shaft.

6 WOOD AND METAL CUTTING BAND SAW—14" and 16" models. Backgearing and cone pulleys similar to those found on screw-cutting lathes, provide speed ranges on 14" saw of from 61 to 1950 S.F.M. with slow speed motor; 175 to 4630 S.F.M. with 1740 r.p.m. motor. Speeds slightly higher on 16" model. Thus practically any material from tool steel to wood can be cut.

7 FLEXIBLE SHAFT MACHINES—a wide variety of models for industrial needs. High speed models for tool and die making, slower speed models for automotive body work, heavier models for foundry grinding and snagging. Wide selection of cores, casings, handpieces, motors and a choice of single-speed or multi-speed drives.

8 DRILL PRESS—bench and floor models available. 13", 14", 15", 16" and 20" sizes. 6-spline spindle. Straddle mounted pulley with precision SKF ball bearings above and below pulley, insure minimum vibration. Solid one-piece head casting. Jacobs Key Chucks regular equipment. Many other fine features.

9 RADIAL DRILL—does drilling, tapping, light profiling speedily and accurately. Drills to center of 62" circle. Max. distance nose of chuck to table—13½". Vertical traverse of spindle 3¾". Head tilts up to 45° right and left. Spindle speeds from 600 to 10,000 r.p.m.

0 JOINTER—single belt and pulley drive or Allis-Chalmers multiple belt. Operating speed 4200 r.p.m., 3450 r.p.m. motor. Unusual safety without loss of utility.


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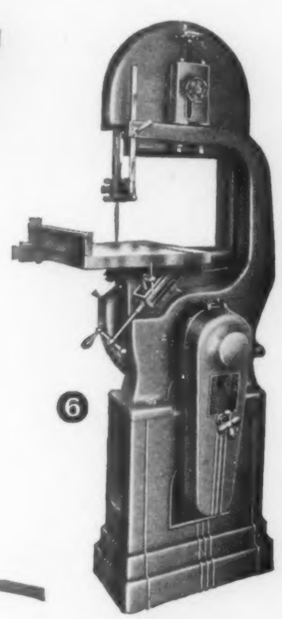
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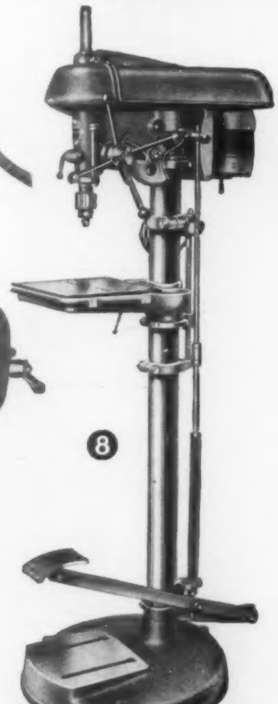
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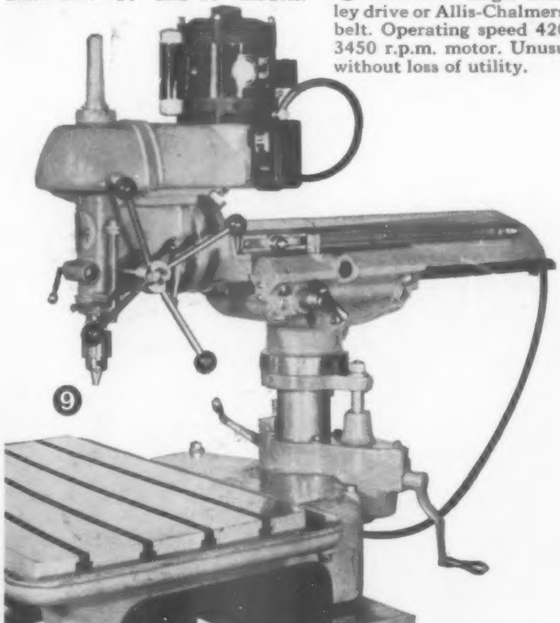
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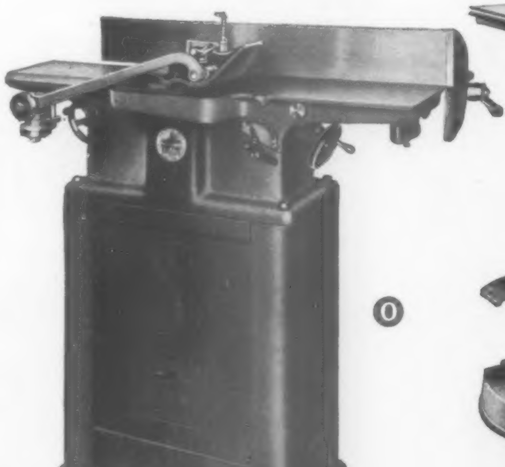
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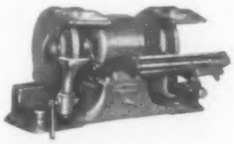
MACHINE TOOLS

TILTING ARBOR SAWS • BELT AND DISC SURFACERS • JIG SAWS • LATHES
RADIAL SAWS • FLEXIBLE SHAFT MACHINES

walker-Turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

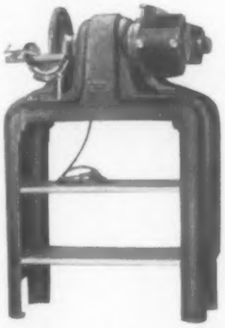
YATES-AMERICAN "W" LINE

These are **primarily**, not incidentally school machines . . . the result of an insistent demand on the part of instructors for a group of Yates-American machines smaller than the "J" Line, but equal in quality. They incorporate modern design, quality construction and accurate workmanship . . . are definitely not "hobby" machines offered on a price basis.



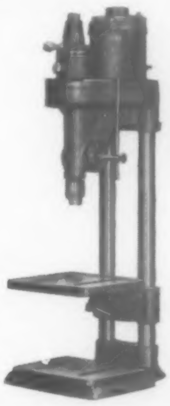
W-80 Grinder Substantially built to resist heavy shock loads and hard usage. Danger zone completely guarded. Equipped with laminated safety glass eye shields. Bit and knife grinding attachment available.

W-55 Variety Saw This 10" tilting arbor variety saw fulfills every requirement of the school shop. Triple "V" belt drive . . . heavy welded steel frame . . . built-in dust disposal system. Exceptionally large table—one piece, no joints, 32" x 36". Without extensions, rips to center of 38" board and cuts off stock 17" wide; with extensions, rips to center of 50" board and cuts stock 25" wide. Thickness capacity, 3 1/4". Improved mitre gauge.



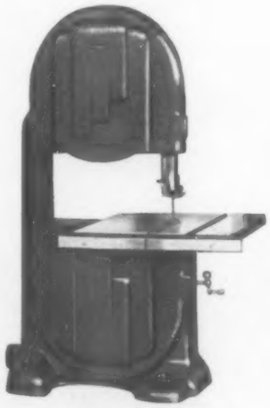
W-90—W-95 Disc and Belt Sander This combination will perform a wide range of sanding operations. Disc sander has scientifically balanced disc. Belt sander has easily removable hood with cross fence attached.

W-20 Lathe Equipped with MULTISPEED Drive. Speeds can be changed without stopping machine or touching belt. Large capacity—14" swing—31" between centers. Belted, belted motor and direct motor drives.



W-30 Drill Press Equipped with MULTISPEED Drive. Substantial base, rigid supporting columns, built-in spindle lock and depth gauge. Spindle and quill chromium plated. Production type table available.

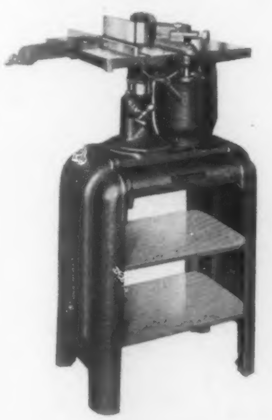
W-70 Jig Saw Equipped with MULTISPEED Drive offering unusually flexible speed control. Fully enclosed motor and driving assembly located to rear and below table within the base. Modern in design.



W-14—W-16 Band Saw One-piece, cast-iron frame with built-in dust chute. Trunnion mounted nickel-alloy, cast-iron table. Industrial type straining device. Top and bottom guides are accessible.

W-50 Circular Saw Frame, saw arbor housing and dove-tailed ways are cast in one solid unit. Cannot be sprung out of alignment. Heavy trunnions support nickel-alloy cast-iron table. Eight inch saw.

W-40 Hand Jointer Knives are entirely covered on both sides of fence and fully enclosed below. Fence cannot stick or jam. Industrial type cutterhead. Built-in dust chute. Full length inclined ways.



W-110 Shaper Equipped with exclusive tilting table if desired. Highly polished table needs no breaking in. Choice of 8,000 or 10,000 R.P.M. Completely enclosed. fabric-belt drive. Fully guarded.

YATES-AMERICAN

SOUTH BEND LATHE WORKS

473 East Madison St., South Bend, Ind., U. S. A.

Manufacturers of South Bend, Back-Geared, Screw-Cutting, Precision Lathes; 68 sizes and types of Quick Change Gear and Standard Change Gear Lathes; 9", 10", 13", 14½" and 16" swing; 3' to 12' bed lengths; Metal Working Precision Lathe Manufacturers for 34 Years

1" Collet, 10" Swing Precision Lathe

16" x 8' Underneath Belt Motor Driven Tool Room Lathe

13" x 5' Underneath Belt Motor Driven Lathe

9" x 3' Workshop Precision Bench Lathe

THERE is a practical size of South Bend Lathe to meet the requirements of every type of school shop. They are used in Trade School Machine Shops, Junior and Senior High School Machine Shops, Large and Small General Shops, Automotive and Electrical Service School Shops, and Farm Mechanics Shops. Special equipment is available for all classes of work, including tool making, automotive and aeronautical service, electrical appliance work, farm mechanics work, etc.

PLANNING A NEW SHOP

If you are planning a new shop, the services of our Engineering Department are available. We shall be glad to help you plan the arrangement of the equipment in your shop, make floor plans, estimate cost, etc. There is no charge or obligation for this service.

WRITE FOR NEW CATALOG No. 100

ON DISPLAY IN ALL PRINCIPAL CITIES

Baltimore, Md.—Carey Mach. & Supply
Boston, Mass.—South Bend Lathe Works*
Bridgeport, Conn.—A. C. Bisgood
Buffalo, N. Y.—R. C. Neal Company, Inc.
Chicago, Ill.—South Bend Lathe Works†
Cleveland, Ohio—Reynolds Mach. Co.
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Detroit, Mich.—Lee Machinery Company
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Milwaukee, Wis.—W. A. Voell Mach. Co.
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THE NEW BRITAIN MACHINE CO.

"New Britain" Shop Equipment New Britain, Conn. *"None Better" Tools*

Four-Student Locker Bench

This 54" x 45" bench has 2¼" maple top, steel supporting frame, steel dust panels, four continuous screw vises, two steel drawers 29" x 15" x 5", four box-type steel lockers 12" x 15" x 12", each drawer and locker having cylinder lock and keys, master-keyed.

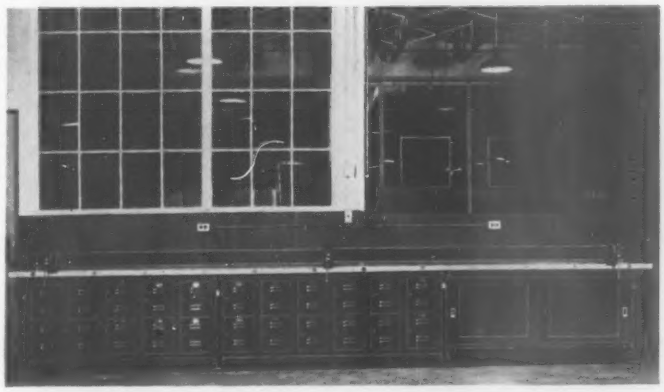
This combination of all-steel drawers and lockers with the manual training top, also with continuous screw vises, dogs and stops, is a particularly handy and pleasing one.

The arrangement of drawers and lockers may be used with any "New Britain" bench.

"NEW BRITAIN" SHOP EQUIPMENT

The "New Britain" line of Steel Shop Equipment meets the increasing demand of schools for durable, splinter-proof, fireproof shop benches. The understructure of every bench is **all steel,** arc-welded or electric spot-welded construction. Neat in appearance, easily cleaned, with dustproof legs and feet, solid, rugged, durable to an extreme, "New Britain" shop equipment will outwear and outlast by many years inferior wooden construction.

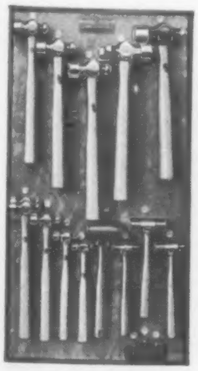
Send for our Catalog 740 for details of work benches, glue and stain benches, welding benches, cabinet and locker benches, art and drawing tables, etc.



"NEW BRITAIN" Combined Cabinet and Locker Bench in a Continuous Bench Installation

Cabinet Bench

These cabinet benches may be had with all steel, or laminated maple tops, or a combination top of steel and wood, which are mounted on New Britain type "O" Bench Legs, with sanitary feet. The under part forms a complete closed in cabinet which may be used for the safe storage of stock, tools, or other material. The steel top cabinet bench is particularly adaptable for use as a stain bench, the steel cabinet underneath affording fireproof storage for lacquers, thinners, enamels, oils, etc. Access to storage space is by means of sliding steel doors, running the entire length of the bench front. Doors are equipped with good grade cylinder locks, or padlock attachment, as may be specified.



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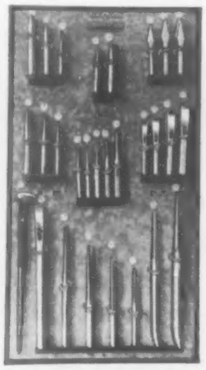

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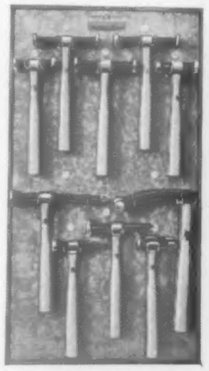
The "NEW BRITAIN" line of tools meets every requirement of the school shop as well as the requirements of mechanics in modern repair shops, garages and industrial plants. The name "NEW BRITAIN" has constantly stood for excellence in quality, reliability and dependability. The tool assortments illustrated on this page include the following:

667—¼" and ⅜" sockets and attachments
668 Box and open end wrenches
674 Screw driver assortment
678 Plier and adjustable wrenches
679 Chisels, bars and punches
684 Machinists' ball pein assortment
699 Body and fender hammers
685 Fender iron and body repair tools
697 ½" drive sockets and attachments
6501 ¾" drive sockets and attachments

Write for Catalog 56—"NEW BRITAIN" Tools



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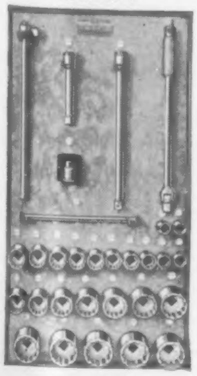

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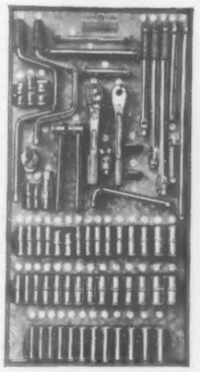

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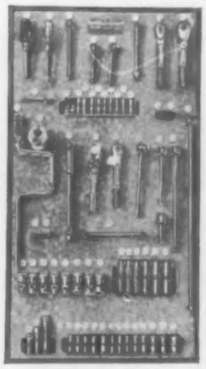

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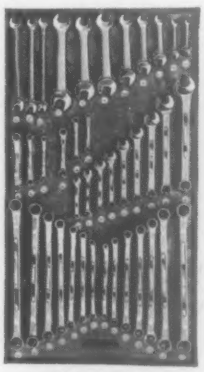

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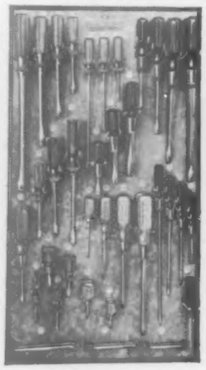

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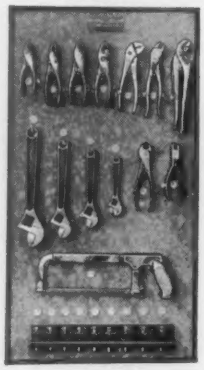

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WICKES BROTHERS

Manufacturers of

Continuous Electric Blue Printing Machines

Saginaw, Mich.

Established 1854

MAKE YOUR OWN

Blueprints

FOR LESS THAN 1¢ PER SQUARE FOOT

REMARKABLE NEW *Simplex* BLUEPRINTER CUTS COST, SAVES TIME — NO EXPENSIVE EQUIPMENT. NO EXPERIENCE NECESSARY! • ACT NOW!

Don't give your money to outside firms for blueprints. With a Simplex Mercury Vapor-Tube Portable Blueprinter you can now make blueprints up to 42" wide (any length) in your own offices at a fraction of regular commercial prices. Makes 250 square feet per hour. Can be used for any of the Special Developing Processes. Requires no carbons or globes. Beautiful black crackle "Weaver" finish. Operates silently. Your office girl can easily operate a Simplex.

FREE TRIAL

FREE TRIAL! Don't take our word for the money-saving advantages of a Simplex! For a limited time only we will ship a regulation, complete Simplex Blueprinter on 30 days' free trial. Satisfaction guaranteed or money refunded. Write today for complete facts about this amazing, money-saving offer.

LYON METAL PRODUCTS, INCORPORATED

General Offices, 1111 Madison Ave., Aurora, Illinois

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CONSULT YOUR CLASSIFIED TELEPHONE DIRECTORY

Lyon Quality Steel Shop and Storage Equipment

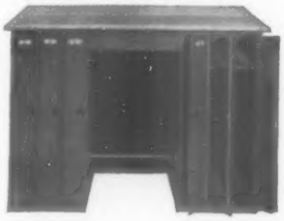
FOR VOCATIONAL SCHOOLS

Lyon Products stand up under the most rigid tests for durability, safety, compactness, and performance.

SEND FOR CATALOG NO. 350 describing products on this page as well as:

LYON QUALITY STEEL . . .

Bench Legs	Shop Tables
Drawer Inserts	Storage Cabinets
Folding Chairs	Tool Cabinets
Lockers	Tool Toters
Shelf Boxes	Wardrobe Cabinets
Shelving	Work Benches

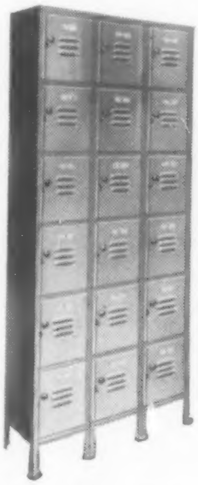


LOCKER DRAWING TABLE

Heavy steel with hard birch top. Provides private locker space for drawing boards and instruments—for students in six successive drafting classes. Fitted with padlock hasps.

SORTING RACK

For storage of drawings, work sheets, sandpaper, emery cloth, and small tools. Shelves are hand adjustable every ½". Recessed bottom permits stacking of these units.

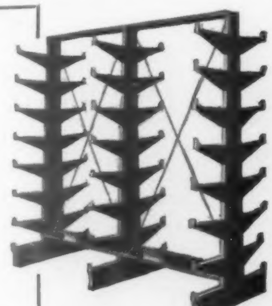


PROJECT LOCKERS

Economical storage space for equipment, "work in progress," and students' work clothes. Will stand up through years of continuous use.

LOCKER-TYPE WORK BENCH

Conserves floor area by providing storage space under bench top — out of the way and easily accessible to students. Eliminates congestion at store room or stock room entrance.



BAR RACKS

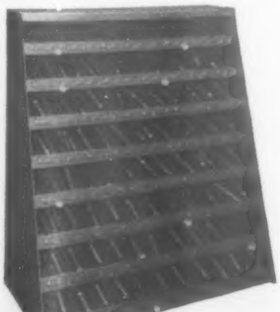
Built to store pipe, tubing, bars, rods and other long items. Available also in single face for use along walls.

← PORTABLE TOOL STAND

Ideal for bringing tools close to the project. Top may be used as a small bench. Flanged edges of top prevent tools from falling off. Available with or without drawer or casters.

LI-FLAT CABINETS

Keep tracings and blueprints orderly and safely. Hinged weights and protecting hoods in drawers assure flat storage. The drawers retain their alignment and operate quietly.



TOOL STORAGE EQUIPMENT

A full line of specially designed cases for accessible and orderly storage and issue of tools. Adapted for use with commercial "check" system of control. Send for Catalog No. 350.

DURABILT STEEL LOCKER CO.

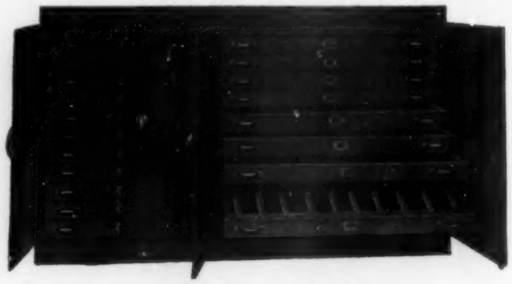
614 Arnold Avenue, Aurora, Ill.

SALES OFFICES IN ALL PRINCIPAL CITIES

STEEL STORAGE EQUIPMENT FOR VOCATIONAL SCHOOLS

Every vocational instructor or supervisor, when confronted with the problem of storage during the daily routine of conducting classes, in dispensing tools and materials, and in controlling the same when not in use, will find the Durabilt Steel Cabinets the answer to his problems.

Tool Cabinet



Blue Print Cabinet

Die Cabinet

PROPER STORAGE FACILITIES

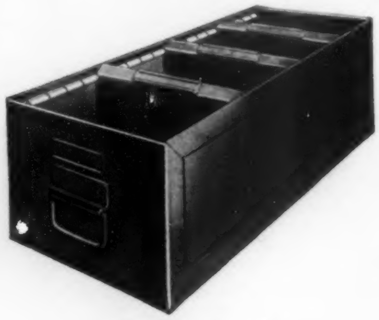
Instructors in vocational school shops have found that waste can be eliminated or considerably reduced by well-organized and controlled system for handling tools and materials.

In the operation of such a system, consideration is usually given to four points:

1. **The receipt of tools, materials, and supplies into stores, and their accurate recording.**
2. **The storing in convenient and safe places and receptacles.**
3. **The delivery of the right material to the right person.**
4. **The keeping of an account of the stores in an accurate and efficient manner.**

Experience has shown that departmental storage of tools and supplies in school shops is most effectively and economically handled by means of standard steel storage cabinets which permit the ready installation of shelves, drawers, trays, compartment boxes, bin fronts, and tool racks for storage purposes. These steel cabinets can now be obtained with a great number of convertible features, making for a variety of applications in the various types of shops found in the school. They can be obtained in a number of sizes which offer considerable range of widths, depths, and heights.

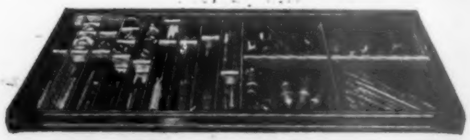
The illustrations here show, in a limited way, the versatility of Durabilt Steel Storage Cabinets for vocational schools.



Shelf Tray with Handle and Card Holder

ARRANGE THE INTERIOR TO FIT SPECIFIC NEEDS

Many standardized interior equipment parts may be attached and placed in a Durabilt Steel Cabinet without the necessity of drilling holes or using special tools. A screw driver, or a pair of pliers, is all that is required to arrange the interior to meet almost any storage demands that may arise. The interior of the cabinet is so designed that it permits a 1" vertical adjustment of any parts attached in the slots which are located in the front and rear corners. The various other parts are so punched or designed that they attach to shelves or slide on the shelves to permit various arrangements for thousands of storage purposes.



Sloping Tool Drawer

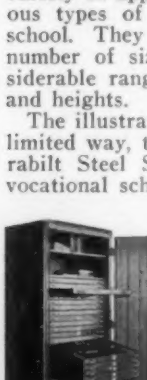
Tool Drawer Partitions

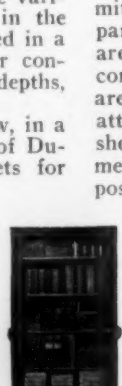
A PART FOR EVERY STORAGE PURPOSE

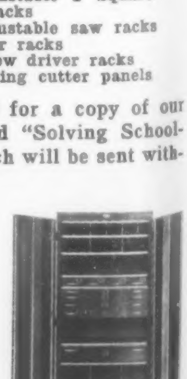
The following lists the various parts that can be used in a standard Durabilt Vocational Storage Cabinet to make any desired interior arrangement.

- **Plain adjustable storage shelves**
- **Vertical shelf partitions**
- **Bin fronts**
- **Shelf partitions**
- **Shelf trays**
- **Shelf compartment boxes**
- **Tool drawers with partitions**
- **Sloping shelves with partitions**
- **Blueprint drawers**
- **Adjustable tool racks**
- **Adjustable T Square racks**
- **Adjustable saw racks**
- **Plier racks**
- **Screw driver racks**
- **Milling cutter panels**

We suggest that you send for a copy of our comprehensive article entitled "Solving School-Shop Storage Problems," which will be sent without obligation to you.







DISTRIBUTING STATE MONEY FOR PUPIL TRANSPORTATION

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In the 1938 edition of The American School and University, was published an article by Dr. T. C. Holy and the writer, entitled "Pupil Transportation in Ohio," which described the study of pupil transportation undertaken in Ohio in September, 1936. The study was made for the purpose of determining a satisfactory means of calculating a recommended cost of pupil transportation for each district, in compliance with the new School Foundation Law, approved by the Ohio Legislature on June 12, 1935, providing that: "The director of education . . . shall make recommendations as to the cost of foundation programs for pupil transportation in districts in which transportation is deemed necessary. The effects of sparsity of population and of other conditions reasonably beyond the control of the board of education of the school district shall be considered in the determination of such transportation costs." *

The facts revealed in the study indicated that it would be advisable to give recognition to a number of influential factors which produce variations in the costs of pupil transportation in the various districts of the state. The procedure described in the former article was developed on the basis of data for the 1936-37 school year and was then reapplied to the data for the same year for purposes of proving and testing. With slight changes resulting from the testing, the procedure was applied to data for the 1937-38 school year, and further revisions made. By September, 1938, the plan had been approved by the controlling board and the director of education and was therefore adopted for use beginning with the 1938-39 school year. Funds were distributed on the new basis for that year and also for the 1939-40 school year. A summary of the distribution figures by counties in Ohio, for the 1939-40 school year is presented herewith as Table I. In this table are given the names of the counties, followed by the number of districts having pupil transportation programs. In column 2 are shown the actual costs reported by the districts. Column 3 indicates the amount produced by the Ten-Factor calculations, and the amount included in the computation of the Foundation Program is given in column 4.

In determining the figures for Table I, it should be observed that calculations were not made by counties, but were made by districts, of which there are from 7 to 36 per county. For each individual district, the actual cost is noted and compared with the ten-factor amount. The lower of the two figures is selected as the recommended annual cost for the district. Thus, if a district spends less than the ten-factor amount, the state recognizes no more than cost. However, if it spends more than the calculated amount, the latter figure is included in the computation of the foundation program, thus imposing upon the local district the necessity of paying the excess cost, from local revenue. Since the lower of the two is selected, for each district, the total of the recommended annual costs for the districts of any county will not exceed the total of either the actual costs or the ten-factor amounts.

The Nine-Factor Plan

The calculating procedure for determining recommended annual costs by districts has been applied to the districts of the state of Ohio for four consecutive years. It appears now that the procedure is sufficiently stabilized to expect it to operate without any important changes for some time to come. In preparing the procedure for the 1940-41 school year, one factor has been eliminated, so that it can now be referred to as the nine-factor plan.

In the original statement presented in the 1938 edition of The American School and University was

* Subsection (d) of Section 7595-1c, Ohio General Code.

described the development of the formula for determining a reasonable cost for each district. Of the influential factors tested, three beyond the control of the board of education, including (a) Number of Pupils Transported, (b) Density and (c) Road Condition, were found to be of greater significance and validity than the remaining factors and these three were then used to develop a regression equation for the purpose of predicting a right cost for each district as directed by the situation with regard to these factors. The regression equation is—

$$C = 5.139 - 1.6402 \ (\text{Log } P) - .0135 \ D + .0064 \ R$$

in which

C = calculated cost per pupil per month
P = number of pupils transported
D = density (transported pupils per square mile)
R = index of road condition. (The per cent of miles of hard-surfaced road, plus two times the per cent of gravel miles, plus three times the per cent of earth miles. Range 100 to 300.)

County and No. of Districts	Actual Cost	Ten-Factor Amount	Recommended Annual Cost	County and No. of Districts	Actual Cost	Ten-Factor Amount	Recommended Annual Cost
1	2	3	4	1	2	3	4
Cities—29	$125,632	$118,018	$112,113	Logan—14	$ 72,045	$ 70,464	$ 69,081
Ex. Vil.—61	352,725	345,739	328,118	Lorain—24	83,832	73,957	73,304
				Lucas—14	68,438	64,167	60,125
Adams—19	85,783	86,840	81,538	Madison—16	50,866	46,052	45,293
Allen—11	60,854	60,224	58,418	Mahoning—13	107,208	79,855	79,855
Ashland—11	48,315	48,578	45,837				
Ashtabula—26	120,975	109,679	107,586	Marion—13	51,099	54,112	46,737
Athens—12	90,597	95,957	89,016	Medina—18	83,331	76,767	76,103
				Meigs—7	76,712	80,694	74,036
Auglaize—15	46,541	42,713	41,621	Mercer—36	48,335	52,287	46,205
Belmont—19	108,833	104,929	99,268	Miami—11	59,056	59,609	57,419
Brown—14	82,710	89,980	81,583				
Butler—18	125,583	119,554	117,272	Monroe—20	77,724	78,373	74,516
Carroll—9	49,513	45,590	45,279	Montgomery—17	106,738	106,874	100,862
				Morgan—12	68,310	65,868	65,636
Champaign—10	52,676	46,368	46,107	Morrow—12	54,346	54,293	52,801
Clark—14	66,527	66,286	61,485	Muskingum—24	106,242	100,944	96,105
Clermont—25	89,991	92,712	86,411				
Clinton—14	60,332	55,592	55,423	Noble—15	67,073	68,059	62,796
Columbiana—15	77,294	81,849	76,071	Ottawa—9	38,288	29,368	27,150
				Paulding—11	42,075	43,332	38,330
Coshocton—19	71,350	73,932	69,971	Perry—15	68,457	76,591	66,764
Crawford—12	47,313	45,825	42,844	Pickaway—15	73,211	63,667	59,256
Cuyahoga—9	35,597	30,319	29,474				
Darke—30	63,564	67,608	60,020	Pike—10	89,496	90,914	87,354
Defiance—11	52,829	47,250	46,444	Portage—21	98,554	98,232	93,709
				Preble—15	67,585	60,169	58,379
Delaware—14	65,977	61,946	60,700	Putnam—16	59,635	59,192	57,698
Erie—9	46,405	45,375	43,495	Richland—12	75,471	69,653	68,582
Fairfield—12	77,681	70,086	73,889				
Fayette—11	54,213	50,220	48,985	Ross—12	108,099	108,475	105,317
Franklin—23	122,181	104,599	103,828	Sandusky—10	27,619	26,574	24,081
				Scioto—15	140,534	158,714	140,038
Fulton—17	59,885	57,361	55,811	Seneca—10	39,448	39,872	35,913
Gallia—17	91,198	89,434	86,394	Shelby—18	52,695	57,982	51,597
Geauga—16	63,427	62,392	60,144				
Greene—11	56,789	56,290	51,755	Stark—29	137,299	136,059	125,103
Guernsey—21	79,420	73,533	65,829	Summit—17	72,330	105,977	72,237
				Trumbull—25	123,155	118,277	110,684
Hamilton—33	96,021	74,182	70,153	Tuscarawas—26	74,672	82,651	72,169
Hancock—10	50,763	54,273	48,687	Union—15	55,897	55,419	53,997
Hardin—8	47,678	45,273	44,430				
Harrison—22	63,662	61,718	57,723	Van Wert—12	59,411	57,202	52,863
Henry—11	52,086	48,117	47,119	Vinton—16	61,177	61,841	58,416
				Warren—12	43,986	45,563	42,701
Highland—15	63,352	64,904	61,665	Washington—22	111,597	120,900	110,176
Hocking—11	69,352	70,430	65,917	Wayne—17	92,109	83,401	80,510
Holmes—13	42,004	40,347	38,567				
Huron—19	63,809	54,565	53,324	Williams—16	42,867	46,245	42,232
Jackson—13	64,017	64,500	59,904	Wood—27	97,246	100,197	91,415
				Wyandot—10	37,259	36,331	33,850
Jefferson—16	77,861	81,906	75,426				
Knox—8	58,217	57,011	55,327				
Lake—11	54,433	52,218	48,416				
Lawrence—17	91,546	103,158	88,598	Totals—1,486	$6,812,418	$6,699,830	$6,296,808
Licking—26	113,380	110,277	107,428				

Table I—Summary of pupil transportation data for the 1939-40 school year

The costs as predicted by this regression equation were compared with the actual district costs, and the direction as well as the amount of difference noted. These variations were then related to a number of influential managerial factors one at a time, to determine what relationship existed. The trend of the relationship was used to prepare a table of adjustments which should be applied to the cost predicted by the regression equation to obtain calculated costs agreeing more closely with the actual costs.

As presented to the boards of education, the equation was omitted and a table given for each factor. For instance, a table of values of -1.6402 (Log P) for all values of P (Number of Pupils Transported) was prepared and these values combined with the constant $+5.139$ to produce Table II. Similarly, the values of $-.0135$ D were computed for all values of D (Density) and these values listed in Table III. Another table was prepared for the factor Road Condition. This enabled board members and school executives in using the procedure to refer to tables and select the right figures, which simplified the use of the procedure in the field and made the results more accurate than might have been obtained if the solution of the formula were undertaken for each application. In order that the method of determining a

Pupils	000	100	200	Pupils	Pupils	000	100	200	Pupils
0	+4.747	+1.698	+1.413	0	50	+1.956	+1.540	+1.338	50
1	+4.277	+1.695	+1.411	1	51	+1.946	+1.538	+1.337	51
2	+3.947	+1.691	+1.409	2	52	+1.936	+1.535	+1.336	52
3	+3.699	+1.688	+1.407	3	53	+1.926	+1.532	+1.335	53
4	+3.513	+1.684	+1.405	4	54	+1.917	+1.530	+1.334	54
5	+3.365	+1.681	+1.403	5	55	+1.908	+1.527	+1.333	55
6	+3.244	+1.677	+1.401	6	56	+1.899	+1.525	+1.332	56
7	+3.144	+1.674	+1.399	7	57	+1.891	+1.522	+1.331	57
8	+3.059	+1.671	+1.397	8	58	+1.883	+1.520	+1.330	58
9	+2.986	+1.667	+1.395	9	59	+1.876	+1.517	+1.329	59
10	+2.923	+1.664	+1.393	10	60	+1.869	+1.515	+1.328	60
11	+2.868	+1.661	+1.391	11	61	+1.862	+1.512	+1.327	61
12	+2.816	+1.657	+1.389	12	62	+1.856	+1.510	+1.326	62
13	+2.767	+1.654	+1.387	13	63	+1.850	+1.507	+1.325	63
14	+2.720	+1.651	+1.385	14	64	+1.844	+1.505	+1.324	64
15	+2.674	+1.647	+1.383	15	65	+1.838	+1.502	+1.323	65
16	+2.629	+1.644	+1.381	16	66	+1.833	+1.500	+1.322	66
17	+2.585	+1.641	+1.380	17	67	+1.828	+1.497	+1.321	67
18	+2.542	+1.637	+1.378	18	68	+1.823	+1.495	+1.320	68
19	+2.500	+1.634	+1.377	19	69	+1.818	+1.492	+1.320	69
20	+2.461	+1.631	+1.375	20	70	+1.813	+1.490	+1.319	70
21	+2.425	+1.627	+1.374	21	71	+1.809	+1.487	+1.319	71
22	+2.392	+1.624	+1.372	22	72	+1.804	+1.485	+1.318	72
23	+2.362	+1.621	+1.371	23	73	+1.800	+1.482	+1.318	73
24	+2.335	+1.617	+1.369	24	74	+1.796	+1.480	+1.317	74
25	+2.310	+1.614	+1.368	25	75	+1.792	+1.477	+1.317	75
26	+2.287	+1.611	+1.366	26	76	+1.788	+1.475	+1.316	76
27	+2.266	+1.607	+1.365	27	77	+1.784	+1.472	+1.316	77
28	+2.247	+1.604	+1.363	28	78	+1.780	+1.470	+1.315	78
29	+2.229	+1.601	+1.362	29	79	+1.776	+1.467	+1.315	79
30	+2.212	+1.598	+1.360	30	80	+1.772	+1.464	+1.314	80
31	+2.196	+1.595	+1.359	31	81	+1.768	+1.461	+1.314	81
32	+2.180	+1.592	+1.357	32	82	+1.764	+1.458	+1.313	82
33	+2.165	+1.589	+1.356	33	83	+1.760	+1.455	+1.313	83
34	+2.150	+1.586	+1.355	34	84	+1.756	+1.452	+1.312	84
35	+2.136	+1.583	+1.353	35	85	+1.752	+1.449	+1.312	85
36	+2.122	+1.580	+1.352	36	86	+1.748	+1.447	+1.311	86
37	+2.108	+1.577	+1.351	37	87	+1.744	+1.444	+1.311	87
38	+2.095	+1.574	+1.350	38	88	+1.740	+1.442	+1.310	88
39	+2.082	+1.571	+1.349	39	89	+1.737	+1.439	+1.310	89
40	+2.069	+1.568	+1.348	40	90	+1.733	+1.437	+1.309	90
41	+2.057	+1.565	+1.347	41	91	+1.730	+1.434	+1.309	91
42	+2.045	+1.562	+1.346	42	92	+1.726	+1.432	+1.308	92
43	+2.033	+1.559	+1.345	43	93	+1.723	+1.429	+1.308	93
44	+2.021	+1.557	+1.344	44	94	+1.719	+1.427	+1.307	94
45	+2.010	+1.554	+1.343	45	95	+1.716	+1.424	+1.307	95
46	+1.999	+1.551	+1.342	46	96	+1.712	+1.422	+1.307	96
47	+1.988	+1.549	+1.341	47	97	+1.709	+1.419	+1.307	97
48	+1.977	+1.546	+1.340	48	98	+1.705	+1.417	+1.307	98
49	+1.966	+1.543	+1.339	49	99	+1.702	+1.415	+1.307	99

Table II—Adjustments for number of pupils transported in the district

	0	10	20	30	40	50	
0	−.000	−.221	−.300	−.366	−.457	−.473	0
1	−.015	−.239	−.301	−.378	−.461	−.474	1
2	−.035	−.255	−.303	−.390	−.464	−.475	2
3	−.060	−.268	−.306	−.401	−.466	−.476	3
4	−.086	−.278	−.310	−.412	−.467	−.477	4
5	−.111	−.286	−.315	−.422	−.468	−.478	5
6	−.135	−.292	−.322	−.431	−.469	−.479	6
7	−.158	−.296	−.331	−.439	−.470	−.480	7
8	−.180	−.298	−.342	−.446	−.471	−.480	8
9	−.201	−.299	−.354	−.452	−.472	−.480	9
	0	10	20	30	40	50	

Table III — Adjustments for density (transported pupils per square mile)

recommended amount for pupil transportation may be apparent, the tables given to the boards of education are presented here as tables II to X for the following factors:

Table	*Factor*
II	Number of Pupils Transported
III	Density
IV	Road Condition and Hilliness
V	Pupils Per Vehicle
VI	Investment Per Pupil
VII	Trips Per Bus
VIII	Per Cent of Capacity Utilized
IX	Per Cent Forward-Facing Seats
X	Bus Miles Per Square Mile

In determining a maximum amount for any district, the situation is noted with regard to the nine factors mentioned in the tables. With information concerning the local condition on one factor, it is then possible to refer to the corresponding table and obtain an adjustment figure which, taken along with those for the other eight factors, will produce a right cost per pupil per month. This unit cost is then multiplied by the number of pupils and the number of months which the buses operate to determine a maximum for the school year. If this maximum is greater than the cost reported by the board, the actual cost is included

LAKE PLAINS

Defiance, Erie — Fulton, Henry — Lake, Lucas, Ottawa — Paulding, Putnam — Sandusky, Wood

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.761	+.799	+.837	+.875	+.913	+.951	+.989	+1.027	+1.065	+1.103	0
1	+.765	+.803	+.841	+.879	+.917	+.955	+.993	+1.031	+1.069	+1.107	1
2	+.769	+.807	+.845	+.883	+.921	+.959	+.997	+1.035	+1.073	+1.111	2
3	+.772	+.810	+.848	+.886	+.924	+.962	+1.000	+1.038	+1.076	+1.114	3
4	+.776	+.814	+.852	+.890	+.928	+.966	+1.004	+1.042	+1.080	+1.118	4
5	+.780	+.818	+.856	+.894	+.932	+.970	+1.008	+1.046	+1.084	+1.122	5
6	+.784	+.822	+.860	+.898	+.936	+.974	+1.012	+1.050	+1.088	+1.126	6
7	+.788	+.826	+.864	+.902	+.940	+.978	+1.016	+1.054	+1.092	+1.130	7
8	+.791	+.829	+.867	+.905	+.943	+.981	+1.019	+1.057	+1.095	+1.133	8
9	+.795	+.833	+.871	+.909	+.947	+.985	+1.023	+1.061	+1.099	+1.137	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.141	+1.179	+1.217	+1.255	+1.293	+1.331	+1.369	+1.407	+1.445	+1.483	0
1	+1.145	+1.183	+1.221	+1.259	+1.297	+1.335	+1.373	+1.411	+1.449	+1.487	1
2	+1.148	+1.186	+1.224	+1.262	+1.300	+1.338	+1.376	+1.414	+1.452	+1.490	2
3	+1.152	+1.190	+1.228	+1.266	+1.304	+1.342	+1.380	+1.418	+1.456	+1.494	3
4	+1.156	+1.194	+1.232	+1.270	+1.308	+1.346	+1.384	+1.422	+1.460	+1.498	4
5	+1.160	+1.198	+1.236	+1.274	+1.312	+1.350	+1.388	+1.426	+1.464	+1.502	5
6	+1.164	+1.202	+1.240	+1.278	+1.316	+1.354	+1.392	+1.430	+1.468	+1.506	6
7	+1.167	+1.205	+1.243	+1.281	+1.319	+1.357	+1.395	+1.433	+1.471	+1.509	7
8	+1.171	+1.209	+1.247	+1.285	+1.323	+1.361	+1.399	+1.437	+1.475	+1.513	8
9	+1.175	+1.213	+1.251	+1.289	+1.327	+1.365	+1.403	+1.441	+1.479	+1.517	9

Table IV-A—Adjustments for road condition and hilliness

TILL PLAINS

Allen	Clinton	Fayette	Huron	Marion	Morrow	Union
Auglaize	Crawford	Franklin	Logan	Mercer	Pickaway	Van Wert
Butler	Darke	Greene	Lorain	Miami	Preble	Warren
Champaign	Delaware	Hancock	Madison	Montgomery	Seneca	Williams
Clark	Fairfield	Hardin			Shelby	Wyandot

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.771	+.810	+.849	+.888	+.927	+.966	+1.005	+1.044	+1.083	+1.122	0
1	+.775	+.814	+.853	+.892	+.931	+.970	+1.009	+1.048	+1.086	+1.125	1
2	+.779	+.818	+.857	+.896	+.935	+.974	+1.012	+1.051	+1.090	+1.129	2
3	+.783	+.822	+.861	+.900	+.938	+.977	+1.016	+1.055	+1.094	+1.133	3
4	+.787	+.826	+.864	+.903	+.942	+.981	+1.020	+1.059	+1.098	+1.137	4
5	+.790	+.829	+.868	+.907	+.946	+.985	+1.024	+1.063	+1.102	+1.141	5
6	+.794	+.833	+.872	+.911	+.950	+.989	+1.028	+1.067	+1.106	+1.145	6
7	+.798	+.837	+.876	+.915	+.954	+.993	+1.032	+1.071	+1.110	+1.149	7
8	+.802	+.841	+.880	+.919	+.958	+.997	+1.036	+1.075	+1.114	+1.153	8
9	+.806	+.845	+.884	+.923	+.962	+1.001	+1.040	+1.079	+1.118	+1.157	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.160	+1.199	+1.238	+1.277	+1.316	+1.355	+1.394	+1.433	+1.472	+1.511	0
1	+1.164	+1.203	+1.242	+1.281	+1.320	+1.359	+1.398	+1.437	+1.476	+1.515	1
2	+1.168	+1.207	+1.246	+1.285	+1.324	+1.363	+1.402	+1.441	+1.480	+1.519	2
3	+1.172	+1.211	+1.250	+1.289	+1.328	+1.367	+1.406	+1.445	+1.484	+1.523	3
4	+1.176	+1.215	+1.254	+1.293	+1.332	+1.371	+1.410	+1.449	+1.488	+1.527	4
5	+1.180	+1.219	+1.258	+1.297	+1.336	+1.375	+1.414	+1.453	+1.491	+1.530	5
6	+1.184	+1.223	+1.262	+1.301	+1.340	+1.379	+1.417	+1.456	+1.495	+1.534	6
7	+1.188	+1.227	+1.266	+1.305	+1.343	+1.382	+1.421	+1.460	+1.499	+1.538	7
8	+1.192	+1.231	+1.269	+1.308	+1.347	+1.386	+1.425	+1.464	+1.503	+1.542	8
9	+1.195	+1.234	+1.273	+1.312	+1.351	+1.390	+1.429	+1.468	+1.507	+1.546	9

Table IV-B—Adjustments for road condition and hilliness

DISSECTED TILL PLAINS

Brown   Clermont   Hamilton   Highland   Ross

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.784	+.824	+.865	+.905	+.945	+.985	+1.026	+1.066	+1.106	+1.146	0
1	+.788	+.828	+.869	+.909	+.949	+.989	+1.030	+1.070	+1.110	+1.150	1
2	+.792	+.832	+.873	+.913	+.953	+.993	+1.034	+1.074	+1.114	+11.54	2
3	+.796	+.836	+.877	+.917	+.957	+.997	+1.038	+1.078	+1.118	+1.158	3
4	+.800	+.840	+.881	+.921	+.961	+1.001	+1.042	+1.082	+1.122	+1.162	4
5	+.804	+.844	+.885	+.925	+.965	+1.005	+1.046	+1.086	+1.126	+1.166	5
6	+.808	+.848	+.889	+.929	+.969	+1.009	+1.050	+1.090	+1.130	+1.170	6
7	+.812	+.852	+.893	+.933	+.973	+1.013	+1.054	+1.094	+1.134	+1.174	7
8	+.816	+.856	+.897	+.937	+.977	+1.017	+1.058	+1.098	+1.138	+1.178	8
9	+.820	+.860	+.901	+.941	+.981	+1.021	+1.062	+1.102	+1.142	+1.182	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.187	+1.227	+1.267	+1.307	+1.348	+1.388	+1.428	+1.468	+1.509	+1.549	0
1	+1.191	+1.231	+1.271	+1.311	+1.352	+1.392	+1.432	+1.472	+1.513	+1.553	1
2	+1.195	+1.235	+1.275	+1.315	+1.356	+1.396	+1.436	+1.476	+1.517	+1.557	2
3	+1.199	+1.239	+1.279	+1.319	+1.360	+1.400	+1.440	+1.480	+1.521	+1.561	3
4	+1.203	+1.243	+1.283	+1.323	+1.364	+1.404	+1.444	+1.484	+1.525	+1.565	4
5	+1.207	+1.247	+1.287	+1.327	+1.368	+1.408	+1.448	+1.488	+1.529	+1.569	5
6	+1.211	+1.251	+1.291	+1.331	+1.372	+1.412	+1.452	+1.492	+1.533	+1.573	6
7	+1.215	+1.255	+1.295	+1.335	+1.376	+1.416	+1.456	+1.496	+1.537	+1.577	7
8	+1.219	+1.259	+1.299	+1.339	+1.380	+1.420	+1.460	+1.500	+1.541	+1.581	8
9	+1.223	+1.263	+1.303	+1.343	+1.384	+1.424	+1.464	+1.504	+1.545	+1.585	9

Table IV-C—Adjustments for road condition and hilliness

GLACIATED PLATEAU

Ashland, Ashtabula, Columbiana, Cuyahoga, Geauga, Knox, Licking, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Wayne

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.801	+.843	+.885	+.927	+.969	+1.011	+1.053	+1.095	+1.137	+1.179	0
1	+.805	+.847	+.889	+.931	+.973	+1.015	+1.057	+1.099	+1.141	+1.183	1
2	+.809	+.851	+.893	+.935	+.977	+1.019	+1.061	+1.103	+1.145	+1.187	2
3	+.814	+.856	+.898	+.939	+.981	+1.023	+1.065	+1.107	+1.149	+1.191	3
4	+.818	+.860	+.902	+.944	+.986	+1.028	+1.070	+1.112	+1.153	+1.195	4
5	+.822	+.864	+.906	+.948	+.990	+1.032	+1.074	+1.116	+1.158	+1.200	5
6	+.826	+.868	+.910	+.952	+.994	+1.036	+1.078	+1.120	+1.162	+1.204	6
7	+.830	+.872	+.914	+.956	+.998	+1.040	+1.082	+1.124	+1.166	+1.208	7
8	+.835	+.877	+.918	+.960	+1.002	+1.044	+1.086	+1.128	+1.170	+1.212	8
9	+.839	+.881	+.923	+.965	+1.007	+1.049	+1.091	+1.132	+1.174	+1.216	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.221	+1.263	+1.305	+1.346	+1.388	+1.430	+1.472	+1.514	+1.556	+1.598	0
1	+1.225	+1.267	+1.309	+1.351	+1.393	+1.435	+1.477	+1.519	+1.560	+1.602	1
2	+1.229	+1.271	+1.313	+1.355	+1.397	+1.439	+1.481	+1.523	+1.565	+1.607	2
3	+1.233	+1.275	+1.317	+1.359	+1.401	+1.443	+1.485	+1.527	+1.569	+1.611	3
4	+1.237	+1.279	+1.321	+1.363	+1.405	+1.447	+1.489	+1.531	+1.573	+1.615	4
5	+1.242	+1.284	+1.325	+1.367	+1.409	+1.451	+1.493	+1.535	+1.577	+1.619	5
6	+1.246	+1.288	+1.330	+1.372	+1.414	+1.456	+1.498	+1.539	+1.581	+1.623	6
7	+1.250	+1.292	+1.334	+1.376	+1.418	+1.460	+1.502	+1.544	+1.586	+1.628	7
8	+1.254	+1.296	+1.338	+1.380	+1.422	+1.464	+1.506	+1.548	+1.590	+1.632	8
9	+1.258	+1.300	+1.342	+1.384	+1.426	+1.468	+1.510	+1.552	+1.594	+1.636	9

Table IV-D—Adjustments for road condition and hilliness

NON-GLACIATED PLATEAU—MODERATE DISSECTION

Belmont, Holmes, Jefferson, Perry

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.814	+.857	+.901	+.944	+.987	+1.030	+1.074	+1.117	+1.160	+1.203	0
1	+.818	+.862	+.905	+.948	+.991	+1.035	+1.078	+1.121	+1.164	+1.208	1
2	+.823	+.866	+.909	+.952	+.996	+1.039	+1.082	+1.126	+1.169	+1.212	2
3	+.827	+.870	+.914	+.957	+1.000	+1.043	+1.087	+1.130	+1.173	+1.216	3
4	+.831	+.875	+.918	+.961	+1.004	+1.048	+1.091	+1.134	+1.177	+1.221	4
5	+.836	+.879	+.922	+.965	+1.009	+1.052	+1.095	+1.138	+1.182	+1.225	5
6	+.840	+.883	+.926	+.970	+1.013	+1.056	+1.100	+1.143	+1.186	+1.229	6
7	+.844	+.888	+.931	+.974	+1.017	+1.061	+1.104	+1.147	+1.190	+1.234	7
8	+.849	+.892	+.935	+.978	+1.022	+1.065	+1.108	+1.151	+1.195	+1.238	8
9	+.853	+.896	+.939	+.983	+1.026	+1.069	+1.113	+1.156	+1.199	+1.242	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.247	+1.290	+1.333	+1.376	+1.420	+1.463	+1.506	+1.550	+1.593	+1.636	0
1	+1.251	+1.294	+1.338	+1.381	+1.424	+1.467	+1.511	+1.554	+1.597	+1.640	1
2	+1.255	+1.299	+1.342	+1.385	+1.428	+1.472	+1.515	+1.558	+1.601	+1.645	2
3	+1.260	+1.303	+1.346	+1.389	+1.433	+1.476	+1.519	+1.563	+1.606	+1.649	3
4	+1.264	+1.307	+1.351	+1.394	+1.437	+1.480	+1.524	+1.567	+1.610	+1.653	4
5	+1.268	+1.312	+1.355	+1.398	+1.441	+1.485	+1.528	+1.571	+1.614	+1.658	5
6	+1.273	+1.316	+1.359	+1.402	+1.446	+1.489	+1.532	+1.575	+1.619	+1.662	6
7	+1.277	+1.320	+1.363	+1.407	+1.450	+1.493	+1.537	+1.580	+1.623	+1.666	7
8	+1.281	+1.325	+1.368	+1.411	+1.454	+1.498	+1.541	+1.584	+1.627	+1.671	8
9	+1.286	+1.329	+1.372	+1.415	+1.459	+1.502	+1.545	+1.588	+1.632	+1.675	9

Table IV-E—Adjustments for road condition and hilliness

NON-GLACIATED PLATEAU—EXTREME DISSECTION

Adams	Gallia	Jackson	Morgan	Scioto
Athens	Guernsey	Lawrence	Muskingum	Tuscarawas
Carroll	Harrison	Meigs	Noble	Vinton
Coshocton	Hocking	Monroe	Pike	Washington

Index	100	110	120	130	140	150	160	170	180	190	Index
0	+.831	+.876	+.921	+.966	+1.011	+1.056	+1.101	+1.146	+1.191	+1.236	0
1	+.835	+.880	+.925	+.970	+1.015	+1.060	+1.105	+1.150	+1.195	+1.240	1
2	+.840	+.885	+.930	+.975	+1.020	+1.065	+1.110	+1.155	+1.200	+1.245	2
3	+.844	+.889	+.934	+.979	+1.024	+1.069	+1.114	+1.159	+1.204	+1.249	3
4	+.849	+.894	+.939	+.984	+1.029	+1.074	+1.119	+1.164	+1.209	+1.254	4
5	+.853	+.898	+.943	+.988	+1.033	+1.078	+1.123	+1.168	+1.213	+1.258	5
6	+.858	+.903	+.948	+.993	+1.038	+1.083	+1.128	+1.173	+1.218	+1.263	6
7	+.862	+.907	+.952	+.997	+1.042	+1.087	+1.132	+1.177	+1.222	+1.267	7
8	+.867	+.912	+.957	+1.002	+1.047	+1.092	+1.137	+1.182	+1.227	+1.272	8
9	+.871	+.916	+.961	+1.006	+1.051	+1.096	+1.141	+1.186	+1.231	+1.276	9

Index	200	210	220	230	240	250	260	270	280	290	Index
0	+1.281	+1.326	+1.371	+1.416	+1.461	+1.506	+1.551	+1.596	+1.641	+1.686	0
1	+1.285	+1.330	+1.375	+1.420	+1.465	+1.510	+1.555	+1.600	+1.645	+1.690	1
2	+1.290	+1.335	+1.380	+1.425	+1.470	+1.515	+1.560	+1.605	+1.650	+1.695	2
3	+1.294	+1.339	+1.384	+1.429	+1.474	+1.519	+1.564	+1.609	+1.654	+1.699	3
4	+1.299	+1.344	+1.389	+1.434	+1.479	+1.524	+1.569	+1.614	+1.659	+1.704	4
5	+1.303	+1.348	+1.393	+1.438	+1.483	+1.528	+1.573	+1.618	+1.663	+1.708	5
6	+1.308	+1.353	+1.398	+1.443	+1.488	+1.533	+1.578	+1.623	+1.668	+1.713	6
7	+1.312	+1.357	+1.402	+1.447	+1.492	+1.537	+1.582	+1.627	+1.672	+1.717	7
8	+1.317	+1.362	+1.407	+1.452	+1.497	+1.542	+1.587	+1.632	+1.677	+1.722	8
9	+1.321	+1.366	+1.411	+1.456	+1.501	+1.546	+1.591	+1.636	+1.681	+1.726	9

Table IV-F—Adjustments for road condition and hilliness

Pupils	0	10	20	30	40	50	60	70	80	90	100	110	120	130	Pupils
0	—	+.749	+.574	+.283	+.038	−.115	−.221	−.287	−.347	−.401	−.440	−.467	−.479	−.484	0
1	+.830	+.736	+.551	+.254	+.019	−.128	−.229	−.293	−.353	−.405	−.443	−.469	−.480	−.485	1
2	+.823	+.722	+.526	+.226	+.001	−.140	−.237	−.299	−.359	−.409	−.446	−.471	−.480	−.485	2
3	+.816	+.707	+.499	+.199	−.016	−.152	−.244	−.305	−.365	−.413	−.449	−.472	−.481	−.485	3
4	+.808	+.691	+.470	+.173	−.032	−.163	−.251	−.311	−.371	−.417	−.452	−.473	−.481	−.486	4
5	+.800	+.674	+.440	+.148	−.047	−.174	−.257	−.317	−.376	−.421	−.455	−.474	−.482	−.486	5
6	+.791	+.656	+.409	+.124	−.061	−.184	−.263	−.323	−.381	−.425	−.458	−.475	−.482	−.486	6
7	+.782	+.637	+.376	+.101	−.075	−.194	−.269	−.329	−.386	−.429	−.461	−.476	−.483	−.486	7
8	+.772	+.617	+.344	+.079	−.089	−.203	−.275	−.335	−.391	−.433	−.463	−.477	−.483	−.487	8
9	+.761	+.596	+.313	+.058	−.102	−.212	−.281	−.341	−.396	−.437	−.465	−.478	−.484	−.487	9

Table V—Adjustments for number of pupils transported per bus

Investment	$0	$10	$20	$30	$40	$50	$60	$70	$80	$90	$100	$110	Investment
0	−.283	−.178	−.081	+.009	+.098	+.164	+.208	+.248	+.280	+.300	+.317	+.319	0
1	−.272	−.168	−.072	+.018	+.106	+.169	+.212	+.252	+.282	+.302	+.318	+.319	1
2	−.261	−.158	−.063	+.027	+.115	+.174	+.216	+.255	+.284	+.304	+.318	+.320	2
3	−.250	−.148	−.054	+.036	+.123	+.178	+.220	+.259	+.286	+.306	+.318	+.320	3
4	−.240	−.138	−.045	+.045	+.130	+.183	+.224	+.262	+.288	+.308	+.318	+.320	4
5	−.229	−.128	−.036	+.054	+.137	+.187	+.228	+.265	+.290	+.310	+.319	+.320	5
6	−.219	−.119	−.027	+.063	+.143	+.192	+.232	+.268	+.292	+.312	+.319	+.320	6
7	−.208	−.109	−.018	+.072	+.149	+.196	+.236	+.271	+.294	+.314	+.319	+.320	7
8	−.198	−.100	−.009	+.081	+.154	+.200	+.240	+.274	+.296	+.315	+.319	+.320	8
9	−.188	−.090	.000	+.089	+.159	+.204	+.244	+.277	+.298	+.316	+.319	+.320	9

Table VI—Adjustments for average investment per pupil

Trips	1	2	3	1	2	3	Trips
.0	+.070	−.034	−.100	+.045	−.078	−.103	.5
.1	+.069	−.047	−.102	+.030	−.083	−.103	.6
.2	+.067	−.057	−.103	+.014	−.088	−.103	.7
.3	+.063	−.065	−.103	−.003	−.093	−.103	.8
.4	+.056	−.072	−.103	−.019	−.097	−.103	.9

Table VII—Adjustments for average number of trips per bus

Per Cent	30%	40%	50%	60%	70%	80%	90%	100%	110%	120%	130%	140%	Per Cent
0	−.099	−.059	−.026	−.015	−.005	+.005	+.015	+.025	+.010	−.109	−.180	−.217	0
1	−.095	−.055	−.024	−.014	−.004	+.006	+.016	+.026	+.003	−.121	−.185	−.219	1
2	−.091	−.051	−.023	−.013	−.003	+.007	+.017	+.027	−.005	−.132	−.190	−.221	2
3	−.087	−.048	−.022	−.012	−.002	+.008	+.018	+.028	−.015	−.141	−.195	−.223	3
4	−.083	−.044	−.021	−.011	+.001	+.009	+.019	+.029	−.027	−.148	−.200	−.225	4
5	−.079	−.041	−.020	−.010	.000	+.010	+.020	+.030	−.040	−.154	−.204	−.227	5
6	−.075	−.037	−.019	−.009	+.001	+.011	+.021	+.028	−.054	−.160	−.207	−.229	6
7	−.071	−.034	−.018	−.008	+.002	+.012	+.022	+.025	−.068	−.165	−.210	−.231	7
8	−.067	−.031	−.017	−.007	+.003	+.013	+.023	+.021	−.082	−.170	−.213	−.233	8
9	−.063	−.028	−.016	−.006	+.004	+.014	+.024	+.016	−.096	−.175	−.215	−.235	9

Table VIII—Adjustments for per cent of capacity utilized

in the calculations. However, if the calculated maximum is less than the actual cost, only the former is allowed.

In Table XI is presented such information concerning the pupil transportation program of any district as is necessary to apply the calculating procedure. Figures are presented in Table XI for one district in Ohio which can serve as an illustration of the

Per Cent	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	Per Cent
0	−.057	−.035	−.015	+.005	+.020	+.030	+.040	+.050	+.056	+.059	0
1	−.054	−.033	−.013	+.007	+.021	+.031	+.041	+.051	+.057	+.059	1
2	−.051	−.031	−.011	+.009	+.022	+.032	+.042	+.052	+.057	+.059	2
3	−.049	−.029	−.009	+.011	+.023	+.033	+.043	+.053	+.057	+.059	3
4	−.047	−.027	−.007	+.013	+.024	+.034	+.044	+.054	+.057	+.059	4
5	−.045	−.025	−.005	+.015	+.025	+.035	+.045	+.055	+.057	+.060	5
6	−.043	−.023	−.003	+.016	+.026	+.036	+.046	+.055	+.058	+.060	6
7	−.041	−.021	−.001	+.017	+.027	+.037	+.047	+.056	+.058	+.060	7
8	−.039	−.019	+.001	+.018	+.028	+.038	+.048	+.056	+.058	+.060	8
9	−.037	−.017	+.003	+.019	+.029	+.039	+.049	+.056	+.058	+.060	9

Table IX—Adjustments for per cent of forward-facing seats

	0	1	2	3	4	5	6	7	8	9	
.0	−.210	−.176	−.140	−.100	−.050	−.006	+.026	+.046	+.066	+.079	.0
.1	−.206	−.173	−.136	−.095	−.045	−.002	+.028	+.048	+.068	+.080	.1
.2	−.202	−.170	−.132	−.090	−.040	+.002	+.030	+.050	+.070	+.081	.2
.3	−.198	−.167	−.128	−.085	−.035	+.006	+.032	+.052	+.072	+.082	.3
.4	−.194	−.164	−.124	−.080	−.030	+.009	+.034	+.054	+.073	+.083	.4
.5	−.191	−.160	−.120	−.075	−.026	+.012	+.036	+.056	+.074	+.084	.5
.6	−.188	−.156	−.116	−.070	−.022	+.015	+.038	+.058	+.075	+.085	.6
.7	−.185	−.152	−.112	−.065	−.018	+.018	+.040	+.060	+.076	+.085	.7
.8	−.182	−.148	−.108	−.060	−.014	+.021	+.042	+.062	+.077	+.085	.8
.9	−.179	−.144	−.104	−.055	−.010	+.024	+.044	+.064	+.078	+.085	.9
	0	1	2	3	4	5	6	7	8	9	

Table X—Adjustments for number of bus miles per square mile

ESSENTIAL INFORMATION CONCERNING A DISTRICT TRANSPORTATION PROGRAM

a.	Number of pupils transported	374	Pupils
b.	Number of vehicles used	10	Vehicles
c.	Present value of school bus equipment	$8,274	
d.	Total number of trips	13	Trips
e.	Lineal feet of seating space		
f.	Forward-facing	280	Ft.
g.	Longitudinal	104	Ft.
h.	Total	384	Ft.
i.	Condition of roads		
j.	High type 9.3%	11	Mi.
k.	Intermediate 58.4%	69	Mi.
l.	Unimproved 32.3%	38	Mi.
m.	Total	118	Mi.
n.	Area of the school district	39	Sq. Mi.
o.	Total miles buses are driven daily	298	Mi.
p.	Number of months buses will operate	9	Mo.

Table XI

method being used. From this table it will be observed that the district being considered is transporting 374 pupils in 10 vehicles, which make a total of 13 trips in the morning. The 10 buses, valued at $8,274, provide space for 280 pupils on forward-facing seats, and for 104 on longitudinal seats. The area of the school district is 39 square miles and has 11 miles of high-type road, 69 miles of intermediate and 38 miles of unimproved road. The 10 buses travel a total of 298 miles per day and operate for 9 months.

The method of using the detailed information about the transportation program in any district in arriving at a reasonable cost of pupil transportation is presented in Table XII. In column 3 of this table, the status of the school district for each of the nine factors has been recorded, and reference is then made to the nine tables (Table II to Table X) to determine increments and deductions corresponding to the status given in column 3. These increments and deductions are listed in column 4 and totaled to produce $2.678 as the maximum amount per pupil per month for this district. Multiplying this by 374 and by 9 months yields $9,014.13 as the maximum amount for the 1940-41 school year for the amount of service and for the conditions described in Table XI.

In determining the adjustment for condition of roads, it will be noted that six tables, including IV-A to IV-F, are available. These six different tables refer to the six gradations of topography found in Ohio ranging from Lake Plains to Non-Glaciated Plateau-Extreme Dissection. The boundaries of the six topographical areas have been noted and the counties listed for each area. Larger amounts are allowed for transportation in the more hilly counties. The figure in the status column for condition of roads is an index, determined by totaling one times the per cent of high-type roads, two times the per cent of intermediate road mileage, and three times the per cent of unimproved. These indices can range from 100 for the best road situation to 300 for the district having all earth roads. A larger amount is paid the district having a larger road index.

This maximum of $9,014.13 will provide an average of $100.16 per bus per month. It is sufficient to enable the board of education to pay about $40 per month to a driver and about $35 per month for operating expense, and to allow $25 per month as the charge for depreciation.

It is interesting to note how this figure might be affected if various conditions differed from those presented in Table XI. In the following paragraphs will be described the effect which a certain variation in some characteristic of the transportation program might have on the maximum amount for the year.

If, for some reason, the 374 transported pupils given in the example were decreased or increased because of shifting population, the maximum amount for this district would be altered by such changes even though the buses, the miles they travel and other conditions in the district remained unchanged. In columns 3 and 4 of Table XIII are given the figures for this district, assuming there are only 300 pupils entitled to transportation, and in columns 5 and 6 are given the figures for an increased number of pupils, increased to the

CALCULATION OF THE MAXIMUM COST OF PUPIL TRANSPORTATION FOR A SCHOOL DISTRICT

1 Refer to Table	2 Factors	3 Status	4 Per Pupil Per Month
II	Number of pupils transported (a)	374	$ +1.307
III	Density (a/n)	10	− .221
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384
V	Pupils per vehicle (a/b)	37	+ .101
VI	Investment per pupil (c/a)	$22	− .063
VII	Trips per bus (d/b)	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	71%	− .004
IX	Per cent of seats facing forward (f/h)	73%	+ .053
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058

Total amount per pupil per month	$ 2.678
Number of pupils (a)	374
Amount for one month	$1,001.57
Number of months (p)	9
Maximum amount for 1940–41	$9,014.13

Table XII

1 Refer to Table	2 Factors	With 300 Pupils 3 Status	With 300 Pupils 4 Per Pupil Per Month	With 524 Pupils 5 Status	With 524 Pupils 6 Per Pupil Per Month
II	Number of pupils transported (a)	300	$ +1.307	524	$ +1.307
III	Density (a/n)	8	− .180	13	− .268
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384	223 F	+1.384
V	Pupils per vehicle (a/b)	30	+ .283	52	− .140
VI	Investment per pupil (c/a)	$ 28	− .009	$ 16	− .119
VII	Trips per bus (d/b)	1.3	+ .063	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	57%	− .018	100%	+ .025
IX	Per cent of seats facing forward (f/h)	73%	+ .053	73%	+ .053
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058	7.6 mi.	+ .058
	Total amount per pupil per month		$ 2.941		$ 2.363
	Number of pupils (a)		300		524
	Amount for one month		$ 882.30		$ 1,238.21
	Number of months (p)		9		9
	Maximum amount for 1940–41		$ 7,940.70		$11,143.89

Table XIII—Calculation showing how maximum cost varies with the number of pupils to be transported

extent of the full seating capacity provided in the buses, or to 524 pupils. If Table XIII is compared with Table XII, it will be observed that a change in the number of pupils produces changes in the status for five factors, including (II) Number of Pupils Transported, (III) Density, (V) Pupils Per Vehicle, (VI) Investment Per Pupil, (VIII) Per Cent of Capacity Utilized. In consequence, the five adjustments obtained from the corresponding tables are changed and the resulting maximum amount is different for the different number of pupils.

If the number of vehicles used by the board is altered, but all other conditions remain the same, the resulting effect upon the maximum amount for the district can be observed from Table XIV. Columns 3 and 4 of Table XIV indicate that $8,066.70 could be approved for 9 buses, whereas $9,014.13 was allowed for 10 buses. Columns 5 and 6 show the effect upon the maximum amount for the year produced by the necessity of employing 5 "feeder" cars to carry a few children to the bus routes. These 5 cars are considered as additional vehicles, and consequently, calculations are based upon 15 vehicles, which include the 10 original buses and the 5 additional cars.

Comparing Table XIV with Table XII shows that an alteration in the number of vehicles may change the status for six factors, including (V) Pupils Per Vehicle, (VI) Investment Per Pupil, (VII) Trips Per Bus, (VIII) Per Cent of Capacity Utilized, (IX) Per Cent of Forward-Facing Seats, and (X) Bus Miles Per Square Mile.

In the example described above, the value of the school-bus equipment was given as $8,274. This is a depreciated value, the amount included for any bus being one-eighth less than the original purchase price for each year's use. According to Table VI, a larger amount is allowed a district which has a greater amount invested in the school-bus equipment. To indicate the effect of the amount invested upon the maximum amount for the year, variations from the $8,274 are shown in Table XV.

Columns 3 and 4 of Table XV are based upon the assumption that 5 new 42-passenger buses, costing $2,200 each, were purchased and the valuation of the equipment thereby was increased to $15,137. This had the effect of increasing the maximum for the year from $9,014.13 to $9,569.52. In columns 5 and 6, figures are presented for the situation if all the buses in this district were more than 8 years old. Under this condition, the value of the equipment would be considered as zero, and the maximum amount calculated by the usual procedure would be $8,273.61. In approving a maximum for such a condition, this figure is further reduced by one-third to $5,515.74. This reduction is based upon the assumption that two-thirds of a normal figure is sufficient to pay the cost of driving and operating the buses, and that nothing needs to be allowed toward that approximately one-third of the cost of transportation which is for the vehicle. It seems quite apparent that the recognition of one-eighth of the original investment each year for 8 years has resulted in completely refunding, to the

		With 9 Vehicles		With 15 Vehicles	
1 Refer to Table	2 Factors	3 Status	4 Per Pupil per Month	5 Status	6 Per Pupil per Month
II	Number of pupils transported (a)	374	$ +1.307	374	$ +1.307
III	Density (a/n)	10	− .221	10	− .221
IV	Condition of roads (i, j, k, l, m)	223F	+1.384	223 F	+1.384
V	Pupils per vehicle (a/b)	42	+ .001	25	+ .440
VI	Investment per pupil (c/a)	$ 20	− .081	$ 22	− .063
VII	Trips per bus (d/b)	1.3	+ .063	1.2	+ .067
VIII	Per cent of capacity utilized (a/h+)	81%	+ .006	67%	− .008
IX	Per cent of seats facing forward (f/h)	77%	+ .056	75%	+ .055
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058	7.9 mi.	+ .064
	Total amount per pupil per month		$ 2.573		$ 3.025
	Number of pupils (a)		374		374
	Amount for one month		$ 962.30		$ 1,131.35
	Number of months (p)		9		9
	Maximum amount for 1940–41		$ 8,660.70		$10,182.15

Table XIV—Calculation showing how maximum cost varies with the number of buses

board or contractor, the full purchase price, and that no further contributions need be made toward depreciation after the eighth year.

The seating capacity of the 10 buses cited in the example is sufficient for 384 pupils, which appears to be adequate to provide for the 374 pupils, with the routes rearranged so that the full seating capacity of the buses is used. If it is assumed that the three second trips are eliminated and that each bus makes only one trip, the resulting effect upon the calculations is shown in Table XVI. A comparison of the figures in this Table with those in Table XII would indicate that a change in the number of trips will alter the status and the corresponding adjustments for three factors including (VII) Trips Per Bus, (VIII) Per Cent of Capacity Utilized, and (X) Bus Miles Per

		With 5 New Buses		With 8-Year-Old Buses	
1 Refer to Table	2 Factors	3 Status	4 Per Pupil per Month	5 Status	6 Per Pupil per Month
II	Number of pupils transported (a)	374	$ +1.307	374	$ +1.307
III	Density (a/n)	10	− .221	10	− .221
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384	223F	+1.384
V	Pupils per vehicle (a/b)	37	+ .101	37	+ .101
VI	Investment per pupil (c/a)	$ 40	+ .098	$ 0	− .283
VII	Trips per bus (d/b)	1.3	+ .063	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	69%	− .006	71%	− .004
IX	Per cent of seats facing forward (f/h)	92%	+ .059	73%	+ .053
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058	7.6 mi.	+ .058
	Total amount per pupil per month		$ 2.843		$ 2.458
	Number of pupils (a)		374		374
	Amount for one month		$ 1,063.28		$ 919.29
	Number of months (p)		9		9
	Maximum amount for 1940–41		$ 9,569.52		$ 8,273.61
				Two-thirds	$ 5,515.74

Table XV—Calculation showing how maximum cost varies with the amount invested in the equipment

Square Mile. According to Table XVI, the maximum amount for this program with no second trips is $9,064.62, whereas $9,014.13 was the maximum, with the 10 buses making a total of 13 trips. This is in accord with the trend indicated by Table VII, entitled Adjustments for Average Number of Trips Per Bus. It provides larger amounts to those districts making only one trip per bus, and lower amounts per pupil per month for those districts which are able to make second and third trips, thereby spreading the transportation costs over two or three loads of children.

According to the data given for this example, the 10 buses had provision for 280 pupils on forward-facing and 104 pupils on longitudinal seats. If all other conditions in the district remained unchanged, and the seating space were entirely longitudinal, the maximum amount for the district would be $8,643.87, as given in columns 3 and 4 of Table XVII. On the other hand, if the 10 buses in the district were completely equipped with forward-facing seats, the maximum amount could be as great as $9,037.71 as shown in columns 5 and 6.

The calculating procedure provides for a larger maximum for those districts having forward-facing seats. The entire range given in Table IX, entitled Adjustments for Per Cent of Forward-Facing Seats, varies from —.057 to +.060, making a total of $.117 or almost 12¢ per pupil per month. This implies that a district having forward-facing seats can receive a greater amount than one having lengthwise seats. The higher allowance is justified by the fact that the cost per pupil is greater with forward-facing seats, since the bus capacity is lower for any given length of bus body. It is further justified by the fact that forward-facing seats are to be encouraged. The School Bus Regulations in use in Ohio now require all new school buses to be equipped with forward-facing seats. Consequently, within a few years, all the buses of the state will have forward-facing seats, and there will no longer be use for the table of adjustments which

1 Refer to Table	2 Factors	3 Status	4 Per Pupil per Month
II	Number of pupils transported (a)	374	$ +1.307
III	Density (a/n)	10	− .221
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384
V	Pupils per vehicle (a/b)	37	+ .101
VI	Investment per pupil (c/a)	$22	− .063
VII	Trips per bus (d/b)	1.0	+ .070
VIII	Per cent of capacity utilized (a/h+)	97%	$ + .022
IX	Per cent of seats facing forward (f/h)	73%	+ .053
X	Bus miles per square mile (o/n)	6.7 mi.	+ .040
	Total amount per pupil per month		$ 2.693
	Number of pupils (a)		374
	Amount for one month		$1,007.18
	Number of months (p)		9
	Maximum amount for 1940–41		$9,064.62

Table XVI—Calculation showing how maximum cost varies if second trips are eliminated

1 Refer to Table	2 Factors	With Longitudinal Seats 3 Status	4 Per Pupil per Month	With Forward Facing Seats 5 Status	6 Per Pupil per Month
II	Number of pupils transported (a)	374	$ +1.307	374	$ +1.307
III	Density (a/n)	10	− .221	10	− .221
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384	223 F	+1.384
V	Pupils per vehicle (a/b)	37	+ .101	37	+ .101
VI	Investment per pupil (c/a)	$ 22	− .063	$ 22	− .063
VII	Trips per bus (d/b)	1.3	+ .063	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	71%	− .004	71%	− .004
IX	Per cent of seats facing forward (f/h)	0%	− .057	100%	+ .060
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058	7.6 mi.	+ .058
	Total amount per pupil per month		$ 2.568		$ 2.685
	Number of pupils (a)		374		374
	Amount for one month		$ 960.43		$ 1,004.19
	Number of months (p)		9		9
	Maximum amount for 1940–41		$ 8,643.87		$ 9,037.71

Table XVII—Calculation showing how maximum cost varies with the type of seating

pertains to the per cent of forward-facing seats, all districts having 100 per cent.

The original data for the district described in the example indicated that there were 11 miles of high-type, 69 miles of intermediate and 38 miles of unimproved road. If it is assumed that the roads are greatly improved so that the 118 miles of road consist of 42 miles of high-type, 76 miles of intermediate and none of the unimproved, the effect of this improved road situation can be noted in columns 3 and 4 of Table XVIII. The table of adjustments for Road Condition and Hilliness provides for a larger amount to those districts having poor roads, and a lower amount to the districts having good roads. With the improvement suggested, the maximum amount for this district would be reduced from $9,014.13 to $8,135.64, as shown in column 4.

If it is assumed that there is no change in the surface condition, but that the topography is changed, the resulting effect of the change is shown in columns 5 and 6. In the original example, Table IV-F was used, indicating that the district selected is in an extremely hilly part of the state of Ohio, classified as Non-Glaciated Plateau—Extreme Dissection. Assuming that all other conditions remain unchanged but that this district is located in an extremely level portion of the state, Table IV-A, entitled Adjustments for Road Condition and Hilliness, Lake Plains, would be used for the road condition adjustment. In columns 5 and 6 it is shown that under these conditions $8,489.07 could be recommended instead of $9,014.13. Under both of the proposals suggested by Table XVIII the roads are better and, consequently, the amount for the transportation program is lower than in the original example.

If it is assumed that the district has 78 square miles instead of 39 square miles, and that, as a consequence, the 10 buses travel 412 miles daily instead of 298, given in Table XI, the maximum amount for the district for one year would be $9,209.34, as shown by the calculations given in Table XIX. The alteration in the area would cause changes in two factors—(III) Density, and (X) Bus Miles Per Square Mile. According to the table of adjustments for Density, a larger unit cost is allowed to the district which has greater sparsity of population. Also, the table on adjustments for Bus Miles Per Square Mile provides for a greater amount in those districts having more complete coverage, or more bus miles per square mile of territory.

If the board decides to operate the school 8 months instead of 9, this decision would not affect the status with regard to the 9 tables, and, consequently, the unit cost per pupil per month would remain the same. However, in determining the amount for the year, the unit cost of $2.678 per pupil per month would be multiplied by 374 pupils and then by 8 months. As a result, the amount for the year would be 8/9 of $9,014.13, or $8,012.56, if the school were operated for only 8 months instead of 9 months.

This serves as a penalty for those districts which decide to operate for only 8 months, because the cost of an 8-month program would be slightly more than 8/9 of the cost of a 9-month program. Under 8

1 Refer to Table	2 Factors	With Improved Roads: 3 Status	With Improved Roads: 4 Per Pupil per Month	With No Hills: 5 Status	With No Hills: 6 Per Pupil per Month
II	Number of pupils transported (a)	374	$ +1.307	374	$ +1.307
III	Density (a/n)	10	− .221	10	− .221
IV	Condition of roads (i, j, k, l, m)	165 F	+1.123	223A	+1.228
V	Pupils per vehicle (a/b)	37	+ .101	37	+ .101
VI	Investment per pupil (c/a)	$ 22	− .063	$ 22	− .063
VII	Trips per bus (d/b)	1.3	+ .063	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	71%	− .004	71%	− .004
IX	Per cent of seats facing forward (f/h)	73%	+ .053	73%	+ .053
X	Bus miles per square mile (o/n)	7.6 mi.	+ .058	7.6 mi.	+ .058
	Total amount per pupil per month		$ 2.417		$ 2.522
	Number of pupils (a)		374		374
	Amount for one month		$ 903.96		$ 943.23
	Number of months (p)		9		9
	Maximum amount for 1940–41		$ 8,135.64		$ 8,489.07

Table XVIII—Calculation showing how maximum cost varies with the type of road

months of operation instead of 9, many of the cost items would be reduced 1/9, but there are some costs, such as depreciation, garage rent and insurance, which would not be reduced and, consequently, the local cost would be slightly more than 8/9 of the 9-month cost. This results in encouraging boards to plan a 9-month program.

Re-Adjusting as Conditions Warrant

For the 1939-40 school year, another table of adjustments, for Per Cent of Board Ownership, was used, but this has been eliminated beginning with September, 1940. That table provided for the allowance of a larger amount to the districts which contract transportation service, because the cost is higher, and a lower amount to the districts which own school buses where the cost is lower. Many board members have regarded this as a penalty for using board-owned equipment. The Department of Education recommends public ownership and therefore has eliminated the table on ownership. This elimination will have the effect of establishing the same maximum for districts having privately-owned and publicly-owned equipment, disregarding the type of ownership. In actual practice, lower amounts will be paid to districts having publicly-owned buses, since such districts consistently request less than do those boards which contract the service.

As indicated above, the next proposed change in the system will be the elimination of the table of adjustments for Per Cent of Forward-Facing Seats. When all buses of the state have forward-facing seats, it will be unnecessary to make any adjustments for the seating arrangement. If further conditions indicate that other factors should be used, the plan is sufficiently flexible to permit the introduction of a new table of adjustments on some new factor at the beginning of any school year.

The procedure used in preparing a new table of adjustments is neither lengthy nor difficult. If it were proposed to introduce a new table, entitled Adjustments for Number of Stops Per Vehicle, the average number of stops per bus would be determined for each of the 1,486 districts of the state. It would also be necessary to determine the amount by which the calculated unit cost, according to the nine-factor plan, varies from the actual cost per pupil per month. The direction of the variation as well as the extent would be observed. These variations for the 1,486 districts would then be related to the number of stops per vehicle for the districts of the state. If a relationship were noticeable, such as the actual costs exceeding the calculated costs in districts making many stops per vehicle, and actual costs lower than calculated costs in districts making fewer stops per vehicle, then a trend of adjustments could be read from the column

1 Refer to Table	2 Factors	3 Status	4 Per Pupil Per Month
II	Number of pupils transported (a)	374	$ +1.307
III	Density (a/n)	5	− .111
IV	Condition of roads (i, j, k, l, m)	223 F	+1.384
V	Pupils per vehicle (a/b)	37	+ .101
VI	Investment per pupil (c/a)	$22	− .063
VII	Trips per bus (d/b)	1.3	+ .063
VIII	Per cent of capacity utilized (a/h+)	71%	− .004
IX	Per cent of seats facing forward (f/h)	73%	+ .053
X	Bus miles per square mile (o/n)	5.3 mi.	+ .006
	Total amount per pupil per month		$ 2.736
	Number of pupils (a)		374
	Amount for one month		$1,023.26
	Number of months (p)		9
	Maximum amount for 1940–41		$9,209.34

Table XIX—Calculation showing how maximum cost varies with area of the district. (Here the area is 78 square miles instead of 39 as shown in Table XI)

of variations between actual and calculated costs, which if combined with the adjustments from the other nine tables would yield calculated costs conforming more closely to the actual costs as reported by the local districts. The use of this additional table on Number of Stops per Vehicle would give for many districts a maximum amount which would come closer to coinciding with the actual cost than could be obtained without the new table. The total cost of the entire state program would not be altered, since the total of the increments and deductions would be held at zero. In the future, it will be possible, through this procedure, to consider this factor or any other factor which appears to be significant, test its value and, if it is found to be useful, include the factor as a part of the program.

In arranging the trend of adjustments for any table, it is not absolutely necessary to follow the trend indicated by the average situation in the state. Instead, the values in the tables of adjustments may be arbitrarily varied in order to reward and encourage good administration, or to penalize and discourage some harmful policy of administration.

A number of states are using factor plans in determining reasonable costs for transportation in the districts of the state, but the tendency has been to use too few of the significant factors. Some states are using only one, such as Density. Others use two, as Density and Number of Pupils. Others use three, including Density, Number of Pupils, and Road Condition. It appears, however, that it is essential to check the local transportation programs from many

different points of view, taking into account several of the factors which influence costs, in order to arrive at a cost which is well fitted to the requirements of the district.

In re-adjusting the program in Ohio through the years to come, it appears that changes should be made slowly as changing conditions in the state justify. Possibly one or two factors should be considered each year. Before accepting any change in a trend of adjustments for a factor, or before adopting any new factor, the relationship between the factor and the variations between actual and calculated costs should be tested carefully.

While the plan being used in Ohio appears to have been very complex in its preparation, still its application to local districts is easily made by board members, bus contractors and superintendents. The formula has been entirely removed from sight, and only the tables are used. If any table of adjustments is considered individually, board members immediately observe that the table is in agreement with their former notions regarding variations in transportation expense. For instance, the table on Density provides for larger unit costs in sparsely settled areas. Any board member, upon examining the table, will immediately indicate that it is only common sense to allow a larger amount per pupil in districts where pupils are widely scattered and a lower amount in the densely settled districts. Board members are also agreed that the table of adjustments for Road Condition and Hilliness should be arranged so that more money will be available in hilly, poor-road areas. Similarly, on Investment Per Pupil, board members fully expect a larger amount to be paid where better equipment is supplied. Also, on the Table of Adjustments for Bus Miles Per Square Mile, it seems obvious to board members that larger amounts will need to be paid where the coverage is more thorough.

The trends of adjustments in all nine tables do not puzzle the board member, but seem to provide adjustments which the member himself would have indicated as proper before the table was presented to him. Since all nine tables are in accord with board members' experience in providing transportation service, they are readily accepted by them as an efficient means of arriving at a reasonable cost. When the plan was first devised, much fear was expressed concerning the difficulties which might be encountered because of the fact that it appeared to be complex, but with use, the procedure is appearing to board members to be based upon common sense and is no longer mysterious.

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Los Angeles	George Pepperdine College	Hugh M. Tiner
Los Angeles	Immaculate Heart College	Sister Mary Eucharia
Los Angeles	Loyola University of Los Angeles	Charles A. McQuillan
Los Angeles	Mount St. Mary's College	Sister Mary Dolorosa
Los Angeles	Occidental College	Remsen D. Bird
Los Angeles	University of Southern California	R. B. von KleinSmid
Oakland	College of the Holy Names	Sister Mary Aloyse
Oakland	Mills College	A. H. Reinhardt
Pasadena	California Institute of Technology	Robert A. Millikan, Ch. Exec. Council
Pasadena	Pasadena College	H. Orton Wiley
Redlands	University of Redlands	Elam J. Anderson
St. Mary's	St. Mary's College	Brother Albert
San Diego	San Diego State College	Walter R. Hepner
San Francisco	Golden Gate College	Nagel T. Miner
San Francisco	San Francisco College for Women	Mother Leonor Mejia
San Francisco	San Francisco State College	Alex. C. Roberts
San Francisco	University of San Francisco	William J. Dunne
San Jose	San Jose State College	T. W. MacQuarrie
San Luis Obispo	California Polytechnic School	Julian A. McPhee
San Rafael	Dominican College of San Rafael	Sister Mary Thomas
Santa Barbara	Santa Barbara State College	Clarence L. Phelps
Santa Clara	University of Santa Clara	Chas. J. Walsh
Stanford Univ.	Stanford University	Ray Lyman Wilbur
Stockton	College of the Pacific	Tully C. Knoles
Whittier	Whittier College	W. O. Mendenhall

Colorado

City	Institution	President
Alamosa	Adams State Teachers College	Ira Richardson
Boulder	University of Colorado	Robert L. Stearns
Colorado Springs	Colorado College	Thurston J. Davies
Denver	Regis College	R. M. Kelley
Denver	University of Denver	David Shaw Duncan, Chancellor
Fort Collins	Colorado State College of Agriculture and Mechanic Arts	Roy M. Green
Golden	Colorado School of Mines	M. F. Coolbaugh
Greeley	Colorado State College of Education	G. W. Frasier
Gunnison	Western State College	C. C. Casey
Loretto	Loretto Heights College	Paul J. Ketrick

Connecticut

City	Institution	President
Danbury	State Normal College	Ralph C. Jenkins
Hartford	The Hartford Seminary Foundation	Robbins W. Barstow
Hartford	Trinity College	Remsen B. Ogilby
Middletown	Wesleyan University	J. L. McConaughy
New Britain	Teachers College of Connecticut	Herbert D. Welte
New Haven	Albertus Magnus College	Sister M. Isabel
New Haven	Arnold College for Hygiene and Physical Education	H. B. Arnold
New Haven	Berkeley Divinity School	Wm. P. Ladd, Dean
New Haven	Connecticut College of Pharmacy	Curtis P. Gladding
New Haven	New Haven State Teachers College	F. E. Engleman
New Haven	Yale University	Charles Seymour
New London	Connecticut College	Katharine Blunt
New London	United States Coast Guard Academy	E. D. Jones
Storrs	The University of Connecticut	Albert N. Jorgensen
West Hartford	St. Joseph College	Mother M. Rinaldo Brennar
Willimantic	Willimantic State Teachers College	George H. Shafer

Delaware

City	Institution	President
Dover	State College for Colored Students	R. S. Grossley
Newark	University of Delaware	Walter Hullihen

District of Columbia

City	Institution	President
Washington	The American University	Edward W. Engel, Acting
Washington	Catholic University of America	Joseph Corrigan
Washington	Gallaudet College	Percival Hall
Washington	Georgetown University	Arthur A. O'Leary
Washington	George Washington University	Cloyd Heck Marvin
Washington	Howard University	M. W. Johnson
Washington	National University	Leslie C. Garnett Chancellor
Washington	Trinity College	Sister Berchmans Julia
Washington	Washington Missionary College	B. G. Wilkinson
Washington	James Ormond Wilson Teachers College	Edgar C. Higbie

Florida

City	Institution	President
Coral Gables	University of Miami	B. F. Ashe
Deland	John B. Stetson University	Wm. Sims Allen
Gainesville	University of Florida	John J. Tigert
Lakeland	Florida Southern College	Ludd M. Spivey
Tallahassee	Florida Agricultural & Mechanical College for Negroes	J. R. E. Lee
Tallahassee	Florida State College for Women	Edward Conradi
Tampa	University of Tampa	James Elliott Mooney
Winter Park	Rollins College	Hamilton Holt

Georgia

City	Institution	President
Albany	Georgia Normal College	J. W. Holley
Athens	University of Georgia	Harmon White Caldwell
Atlanta	Atlanta University	Rufus E. Clement
Atlanta	Clark College	M. S. Davage
Atlanta	Georgia School of Technology	Marion L. Brittain
Atlanta	Morehouse College	Chas. D. Hubert, Acting
Atlanta	Morris Brown College	W. A. Fountain, Jr.
Atlanta	Spelman College	Florence M. Read
Augusta	Paine College	E. C. Peters
Collegeboro	South Georgia Teachers College	M. S. Pittman
Decatur	Agnes Scott College	James R. McCain
Demorest	Piedmont College	Malcolm Boyd Dana
Emory University	Emory University	Harvey W. Cox
Forsyth	Bessie Tift College	C. L. McGinty
Gainesville	Brenau College	H. J. Pearce
Industrial College	Georgia State College	B. F. Hubert
La Grange	La Grange College	H. T. Quillian
Macon	Mercer University	Spright Dowell
Macon	Wesleyan College	Dice R. Anderson
Milledgeville	Georgia State College for Women	Guy H. Wells
Mount Berry	Berry College	Gardner L. Green
Oglethorpe University	Oglethorpe University	Thornwell Jacobs
Rome	Shorter College	Paul M. Cousins
Valdosta	Georgia State Woman's College	Frank R. Reade

Idaho

City	Institution	President
Albion	Albion State Normal School	R. H. Snyder
Caldwell	The College of Idaho	W. W. Hall, Jr.
Lewiston	Lewiston State Normal School	J. E. Turner
Moscow	University of Idaho	Harrison C. Dale
Nampa	Northwest Nazarene College	Russell V. DeLong

Illinois

City	Institution	President
Alton	Shurtleff College	Guy Halbert Wimmer
Aurora	Aurora College	Theodore Pierson Stephens
Bloomington	Illinois Wesleyan University	William E. Shaw
Carbondale	Southern Illinois Normal University	Roscoe Pulliam
Carthage	Carthage College	Rudolph G. Schulz, Jr.
Charleston	Eastern Illinois State Teachers College	Robert G. Buzzard
Chicago	Chicago Institute of Technology	Henry T. Heald
Chicago	Central Y. M. C. A. College	Edward J. Sparling
Chicago	Chicago College of Osteopathy	R. N. MacBain
Chicago	Chicago Teachers College	John A. Bartky
Chicago	Chicago Theological Seminary	Albert W. Palmer
Chicago	De Paul University	Michael J. O'Connell
Chicago	George Williams College	Harold C. Coffman
Chicago	Loyola University	Samuel K. Wilson
Chicago	Mundelein College	Sister Mary Justitia
Chicago	Pestalozzi Froebel Teachers College	Herman H. Hegner
Chicago	St. Francis Xavier College for Women	Sister Mary Inez
Chicago	The University of Chicago	Robert M. Hutchins
Decatur	James Millikin University	John C. Hessler
De Kalb	Northern Illinois State Teachers College	Karl L. Adams
Elsah	The Principia College of Liberal Arts	Frederic E. Morgan
Elmhurst	Elmhurst College	Timothy Lehmann
Eureka	Eureka College	Burris Dickinson
Evanston	National College of Education	Edna Dean Baker
Evanston	Northwestern University	Franklyn Bliss Snyder
Galesburg	Knox College	Carter Davidson
Greenville	Greenville College	H. J. Long
Jacksonville	Illinois College	Harris Gary Hudson
Jacksonville	MacMurray College for Women	C. P. McClelland
Joliet	College of St. Francis	Sister M. Aniceta
Lake Forest	Barat College of the Sacred Heart	Mother Eleanor Regan
Lake Forest	Lake Forest College	H. McComb Moore
Lebanon	McKendree College	C. R. Yost
Lisle	St. Procopius College	Procopius Neuzil
Macomb	Western Illinois State Teachers College	W. P. Morgan
Monmouth	Monmouth College	James H. Grier
Mundelein	St. Mary of the Lake Seminary	Reynold Hillenbrand
Naperville	North Central College	Edward E. Rall
Normal	Illinois State Normal University	R. W. Fairchild
Peoria	Bradley Polytechnic Institute	F. R. Hamilton
Peru	St. Bede College	Justus Wirth
Quincy	Quincy College	John Koebele
River Forest	Rosary College	Sister Mary Evelyn
Rockford	Rockford College	Mary A. Cheek
Rock Island	Augustana College and Theological Seminary	Conrad Bergendoff
Urbana	University of Illinois	A. C. Willard
Wheaton	Wheaton College	V. R. Edman, Acting

Indiana

City	Institution	President
Bloomington	Indiana University	Herman B. Wells
Collegeville	St. Joseph's College	Aloys H. Dirksen
Crawfordsville	Wabash College	G. V. Kendall, Acting
Danville	Central Normal College	Virgil Hunt
Evansville	Evansville College	Lincoln B. Hale, Acting
Franklin	Franklin College of Indiana	Wm. Gear Spencer
Goshen	Goshen College	Ernest E. Miller
Greencastle	DePauw University	Clyde E. Wildman
Hanover	Hanover College	A. G. Parker, Jr.
Holy Cross	St. Mary's College, Notre Dame	Sister M. Madeleva
Huntington	Huntington College	O. R. Stilson, Dean
Indianapolis	Butler University	Daniel Sommer Robinson
Indianapolis	Indiana Central College	I. J. Good
Indianapolis	Indianapolis College of Pharmacy	Edward H. Niles
Indianapolis	Normal College of the American Gymnastic Union	Carl B. Sputh
Lafayette	Purdue University	Edward C. Elliott
Marion	Marion College	Wm. F. McConn
Muncie	Ball State Teachers College	L. A. Pittenger
N. Manchester	Manchester College	Otho Winger
Notre Dame	University of Notre Dame	J. Hugh O'Donnell
Oakland City	Oakland City College	W. P. Dearing
Richmond	Earlham College	William C. Dennis
St. Mary-of-the-Woods	St. Mary-of-the-Woods College	Mother Mary Bernard
Terre Haute	Indiana State Teachers College	Ralph N. Tirey
Terre Haute	Rose Polytechnic Institute	Donald B. Prentice
Upland	Taylor University	Robert Lee Stuart
Valparaiso	Valparaiso University	O. P. Kretzmann

Iowa

City	Institution	President
Ames	Iowa State College of Agriculture and Mechanic Arts	Charles E. Friley
Cedar Falls	Iowa State Teachers College	Malcolm Price
Cedar Rapids	Coe College	Harry M. Gage
Davenport	St. Ambrose College	A. J. Burke
Decorah	Luther College	O. J. H. Preus
Des Moines	Des Moines College of Pharmacy	F. W. Fitch
Des Moines	Des Moines Still College of Osteopathy	A. O. Becker
Des Moines	Drake University	D. W. Morehouse
Dubuque	Clarke College	Sister Mary Antonia Durkin
Dubuque	Loras College	M. J. Martin
Dubuque	University of Dubuque	Dale D. Welch
Fairfield	Parsons College	Horace Gunthorp, Vice President
Fayette	Upper Iowa University	Vivian T. Smith
Grinnell	Grinnell College	Samuel Nowell Stevens
Indianola	Simpson College	John Owen Gross
Iowa City	State University of Iowa	Virgil M. Hancher
Le Mars	Western Union College	D. O. Kime
Mount Pleasant	Iowa Wesleyan College	Stanley B. Niles
Mount Vernon	Cornell College	John Benjamin Magee
Oskaloosa	William Penn College	Edwin McGrew
Pella	Central College	Irwin J. Lubbers
Sioux City	Morningside College	Earl A. Roadman
Sioux City	Trinity College	E. M. Leimkuhler
Storm Lake	Buena Vista College	Henry Olson
University Park	John Fletcher College	Charles W. Butler
Waverly	Wartburg College	E. J. Braulick

Kansas

City	Institution	President
Atchison	Mt. St. Scholastica College	Mother Lucy Dooley
Atchison	St. Benedict's College	Martin Veth

City	Institution	President
Baldwin	Baker University	Nelson P. Horn
Emporia	College of Emporia	Leslie G. Whitcomb
Emporia	Kansas State Teachers College	Thomas W. Butcher
Hays	Fort Hays Kansas State College	C. E. Rarick
Lawrence	University of Kansas	Deane W. Malott
Leavenworth	St. Mary College	Arthur M. Murphy
Lindsborg	Bethany College	Ernst F. Pihlblad
McPherson	McPherson College	V. F. Schwalm
Manhattan	Kansas State College of Agriculture and Applied Science	Francis D. Farrell
North Newton	Bethel College	Ed. G. Kaufman
Ottawa	Ottawa University	Andrew B. Martin
Pittsburg	Kansas State Teachers College	
St. Marys	The St. Mary's College	D. H. Conway
Salina	Kansas Wesleyan University	E. K. Morrow
Salina	Marymount College	Mother Rose Waller
Sterling	Sterling College	H. A. Kelsey
Topeka	Washburn College	Philip C. King
Wichita	Friends University	W. A. Young
Wichita	Municipal University of Wichita	William M. Jardine
Winfield	Southwestern College	Frank E. Mossman

Kentucky

City	Institution	President
Barbourville	Union College	Conway Boatman
Berea	Berea College	Francis S. Hutchins
Bowling Green	Western Kentucky State Teachers College	Paul L. Garrett
Covington	Villa Madonna College	Michael Leick
Danville	Centre College of Kentucky	Robt. L. McLeod, Jr.
Frankfort	Kentucky State College	R. B. Atwood
Georgetown	Georgetown College	Henry Noble Sherwood
Lexington	Transylvania College	R. F. McLain
Lexington	University of Kentucky	Thomas P. Cooper, Acting
Louisville	Louisville College of Pharmacy	A. P. Markendorf
Louisville	Louisville Municipal College for Negroes, University of Louisville	Raymond A. Kent
Louisville	Nazareth College	Sister Mary Anastasia Coady
Louisville	The Southern Baptist Theological Seminary	John R. Sampey
Louisville	University of Louisville	Raymond A. Kent
Morehead	Morehead State Teachers College	William H. Vaughan
Murray	Murray State Teachers College	James H. Richmond
Richmond	Eastern Kentucky State Teachers College	H. L. Donovan
Wilmore	Asbury College	Z. T. Johnson
Winchester	Kentucky Wesleyan College	Paul Shell Powell

Louisiana

City	Institution	President
Hammond	Southeastern Louisiana College	J. Leon Clark
Lafayette	Southwestern Louisiana Institute	Lether E. Frazar
Natchitoches	Louisiana State Normal College	A. A. Fredericks
New Orleans	Dillard University	
New Orleans	Loyola University	P. A. Roy
New Orleans	The H. Newcomb Memorial, Tulane University College	Frederick Hard, Dean
New Orleans	St. Mary's Dominican College	Sister Mary Vincent
New Orleans	The Tulane University of Louisiana	Rufus C. Harris
New Orleans	Ursuline College	Mother Loretta
New Orleans	Xavier University	Mother M. Agatha
Pineville	Louisiana College	Claybrook Cottingham
Ruston	Louisiana Polytechnic Institute	E. S. Richardson
Scotlandville	Southern University and Agricultural and Mechanical College	Felton G. Clark
Shreveport	Centenary College	Pierce Cline
Shreveport	St. Vincent's College	Mother Eugenia
University	Louisiana State University	Paul M. Hebert, Acting

Maine

City	Institution	President
Brunswick	Bowdoin College	Kenneth C. M. Sills
Castine	Eastern State Normal School	William D. Hall
Farmington	State Normal School	Lorey C. Day
Fort Kent	Madawaska Training School	Richard F. Crocker
Gorham	Gorham Normal School	Francis L. Bailey
Lewiston	Bates College	Clifton D. Gray
Machias	Washington State Normal School	Philip H. Kimball
Orono	University of Maine	Arthur A. Hauck
Presque Isle	Aroostook State Normal School	Clifford O. T. Wieden
Springvale	Nasson College	Dawn N. Wallace
Waterville	Colby College	Franklin W. Johnson

Maryland

City	Institution	President
Annapolis	St. John's College	Stringfellow Barr
Baltimore	College of Notre Dame of Maryland	Sister M. Frances
Baltimore	Goucher College	David A. Robertson
Baltimore	Johns Hopkins University	Isaiah Bowman
Baltimore	Loyola College	Edward B. Bunn
Baltimore	Milton University	Wm. Jas. Heaps
Baltimore	Morgan College	D. O. W. Holmes
Baltimore	St. Mary's Seminary & University	John F. Fenlon
Bowie	State Teachers College	L. S. James
Chestertown	Washington College	Gilbert W. Mead
College Park	University of Maryland	H. C. Byrd
Emmitsburg	Mount St. Mary's College	John L. Sheridan
Emmitsburg	St. Joseph's College	Sister Paula
Frederick	Hood College	Henry I. Stahr
Frostburg	State Teachers College	John L. Dunkle
Lutherville	Maryland College for Women	William H. Moore
New Windsor	Blue Ridge College	Homer E. Cooper
Salisbury	State Teachers College	J. D. Blackwell
Towson	State Teachers College	M. Theresa Wiedefeld
Westminster	Western Maryland College	F. G. Holloway

Massachusetts

City	Institution	President
Amherst	Amherst College	Stanley King
Amherst	Massachusetts State College	Hugh P. Baker
Boston	Boston University	Daniel L. Marsh
Boston	Emmanuel College	Sister Teresa Patricia
Boston	Massachusetts College of Pharmacy	H. C. Newton, Dean
Boston	Northeastern University	Carl S. Ell
Boston	Portia Law School and Calvin Coolidge College	A. Chesley York
Boston	Simmons College	Bancroft Beatley
Boston	Suffolk University	Gleason L. Archer
Boston	Teachers College of the City of Boston	Wm. H. J. Kennedy
Bridgewater	State Teachers College	John J. Kelly
Cambridge	Harvard University	James B. Conant
Cambridge	Massachusetts Institute of Technology	Karl T. Compton
Cambridge	Radcliffe College	Ada L. Comstock
Chestnut Hill	Boston College	Wm. J. Murphy
Fitchburg	State Teachers College	Charles M. Herlihy
Framingham	State Teachers College	M. F. O'Connor
Hyannis	State Teachers College	Herbert H. Howes
Lowell	Lowell Textile Institute	Charles H. Eames
Lowell	State Teachers College	James Dugan
Medford	Tufts College	Leonard Carmichael
Newton Center	Andover Newton Theological School	Everett C. Herrick
North Adams	State Teachers College	Grover C. Bowman
Northampton	Smith College	Herbert J. Davis
Norton	Wheaton College	John Edgar Park
Salem	State Teachers College	Edward A. Sullivan
South Hadley	Mount Holyoke College	Roswell G. Ham
South Lancaster	Atlantic Union College	G. Eric Jones
Springfield	American International College	Chester S. McGown
Springfield	International YMCA College	Ernest M. Best
Waltham	Middlesex University	C. Ruggles Smith
Wellesley	Wellesley College	Mildred H. McAfee
Westfield	State Teachers College	Edw. J. Scanlon
Weston	Regis College	Sister Genevieve Marie
Williamstown	Williams College	J. P. Baxter, 3rd
Worcester	Clark University	Wallace W. Atwood
Worcester	Holy Cross College	Joseph R. N. Maxwell
Worcester	State Teachers College	Clinton E. Carpenter
Worcester	Worcester Polytechnic Institute	Wat Tyler Cluverius

Michigan

City	Institution	President
Adrian	Adrian College	Samuel J. Harrison
Adrian	Siena Heights College	Mother M. Gerald
Albion	Albion College	John L. Seaton
Alma	Alma College	John Wirt Dunning
Ann Arbor	University of Michigan	Alex. G. Ruthven
Berrien Springs	Emmanuel Missionary College	H. J. Klooster
Big Rapids	Ferris Institute	M. S. Ward
Detroit	Detroit College of Law	William Krichbaum, Dean
Detroit	Detroit Institute of Technology	Paul Hickey
Detroit	Marygrove College	Sister M. Honora
Detroit	Sacred Heart Seminary	Henry E. Donnelly
Detroit	University of Detroit	Charles H. Cloud
Detroit	Wayne University	Frank Cody
East Lansing	Michigan State College of Agriculture and Applied Science	Robert S. Shaw
Grand Rapids	Calvin College	Henry Schultze

City	Institution	President
Hillsdale	Hillsdale College	Willfred Mauck
Holland	Hope College	Wynand Wichers
Houghton	Michigan College of Mining and Technology	Grover C. Dillman
Kalamazoo	Kalamazoo College	Paul L. Thompson
Kalamazoo	Western State Teachers College	Paul V. Sangren
Marquette	Northern State Teachers College	Webster H. Pearce
Mt. Pleasant	Central State Teachers College	Charles L. Anspach
Nazareth	Nazareth College	Sister Mary Kevin
Olivet	Olivet College	Joseph Brewer
Orchard Lake	St. Mary's College	L. J. Krzyzosiak
Ypsilanti	Michigan State Normal College	J. M. Munson

Minnesota

City	Institution	President
Bemidji	State Teachers College	C. R. Sattgast
Collegeville	St. John's University	Alcuin Deutsch
Duluth	College of St. Scholastica	Mother M. Agnes Somers
Duluth	Duluth State Teachers College	Herbert Sorenson
Mankato	State Teachers College	Frank D. McElroy
Minneapolis	Augsburg College and Theological Seminary	Bernhard Christensen
Minneapolis	University of Minnesota	Guy Stanton Ford
Moorhead	Concordia College	J. N. Brown
Moorhead	Moorhead State Teachers College	R. B. MacLean
New Ulm	Dr. Martin Luther College	Carl L. Schweppe
Northfield	Carleton College	Donald J. Cowling
Northfield	St. Olaf College	L. W. Boe
St. Cloud	State Teachers College	George A. Selke
St. Joseph	College of St. Benedict	Mother Rosamond Pratschner
St. Paul	Bethel Institute	G. A. Hagstrom
St. Paul	College of St. Catherine	Sister Eucharista
St. Paul	College of St. Thomas	James H. Moynihan
St. Paul	Hamline University	Charles N. Pace
St. Paul	Macalester College	Charles J. Turck
St. Peter	Gustavus Adolphus College	O. J. Johnson
Winona	College of St. Teresa	Sister Mary A. Molloy
Winona	St. Mary's College	Brother Leopold
Winona	Winona State Teachers College	O. Myking Mehus

Mississippi

City	Institution	President
Alcorn	Alcorn Agricultural & Mechanical College	Wm. H. Bell
Blue Mountain	Blue Mountain College	Lawrence T. Lowrey
Cleveland	Delta State Teachers College	W. M. Kethley
Clinton	Mississippi College	D. M. Nelson
Columbus	Mississippi State College for Women	B. L. Parkinson
Hattiesburg	The Mississippi Southern College	J. B. George
Holly Springs	Rust College	L. M. McCoy
Jackson	Belhaven College	G. T. Gillespie
Jackson	Jackson College	B. Baldwin Dansby
Jackson	Millsaps College	M. L. Smith
State College	Mississippi State College	G. D. Humphrey
Tougaloo	Tougaloo College	Judson L. Cross
University	University of Mississippi	A. B. Butts, Chancellor

Missouri

City	Institution	President
Canton	Culver Stockton College	W. H. McDonald
Cape Girardeau	Southeast Missouri State Teachers College	Walter W. Parker
Columbia	University of Missouri	F. A. Middlebush
Fayette	Central College	Robert H. Ruff
Fulton	Westminster College	F. L. McCluer
Jefferson City	Lincoln University	Sherman D. Scruggs
Kansas City	Kansas City College of Osteopathy & Surgery	Geo. J. Conley
Kansas City	Kansas City-Western Dental College	R. J. Rinehart, Dean
Kansas City	Rockhurst College	William H. McCabe
Kansas City	Teachers College of Kansas City	J. C. Bond
Kansas City	University of Kansas City	Clarence R. Decker
Kirksville	Kirksville College of Osteopathy & Surgery	Geo. M. Laughlin
Kirksville	Northeast Missouri State Teachers College	Walter H. Ryle
Liberty	William Jewell College	John F. Herget
Marshall	Missouri Valley College	Thos. Wm. Bibb
Maryville	Northwest Missouri State Teachers College	Uel W. Lamkin
Parkville	Park College	Wm. Lindsay Young
St. Charles	Lindenwood College	Guy C. Motley, Acting
St. Louis	Concordia Theological Seminary	L. Fuerbringer
St. Louis	Harris Teachers College	W. N. Sellman
St. Louis	Maryville College	Mother M. O. Mouton
St. Louis	St. Louis College of Pharmacy	Robert L. Lund
St. Louis	St. Louis University	H. B. Crimmins
St. Louis	Stowe Teachers College	Ruth Harris
St. Louis	Washington University	George R. Throop, Chancellor
Springfield	Drury College	J. F. Findlay
Springfield	Southwest Missouri State Teachers College	Roy Ellis
Tarkio	Tarkio College	M. Earle Collins
Warrensburg	Central Missouri State Teachers College	G. W. Diemer
Webster Groves	Webster College	George F. Donovan

Montana

City	Institution	President
Billings	Eastern Montana State Normal School	L. B. McMullen
Billings	Billings Polytechnic Institute	Ernest T. Eaton
Bozeman	Montana State College	A. L. Strand
Butte	Montana School of Mines	Francis A. Thomson
Dillon	Montana State Normal College	Sheldon E. Davis
Helena	Carroll College	Emmet J. Riley
Missoula	Montana State University	George F. Simmons

Nebraska

City	Institution	President
Blair	Dana College	Lawrence Siersbeck
Central City	Nebraska Central College	O. W. Carrell
Chadron	Nebraska State Teachers College	E. L. Rouse, Acting
Crete	Doane College	Bryan S. Stoffer
Fremont	Midland College	Fred C. Weigman
Hastings	Hastings College	J. W. Creighton
Kearney	State Teachers College	Herbert L. Cushing
Lincoln	Nebraska Wesleyan University	Benjamin F. Schwartz
Lincoln	Union College	A. H. Rulkoetter
Lincoln	University of Nebraska	C. S. Boucher, Chancellor
Omaha	Creighton University	Joseph P. Zuercher
Omaha	Duchesne College	Mother Helen Casey
Omaha	University of Omaha	Rowland Haynes
Peru	Nebraska State Teachers College	W. R. Pate
Seward	Concordia Teachers College	C. F. Brommer
Wayne	Nebraska State Teachers College	J. T. Anderson
York	York College	D. E. Weidler

Nevada

City	Institution	President
Reno	University of Nevada	Leon W. Hartman

New Hampshire

City	Institution	President
Durham	University of New Hampshire	Fred Engelhardt
Hanover	Dartmouth College	Ernest M. Hopkins
Hudson	Rivier College	Sister Marie Madeleine
Keene	Keene Teachers College	Lloyd P. Young
Manchester	St. Anselm's College	Bertrand C. Dolan
Plymouth	Plymouth Teachers College	Ernest L. Silver

New Jersey

City	Institution	President
Convent Station	College of St. Elizabeth	Sister Marie Jose
East Orange	Panzer College of Physical Education	Margaret C. Brown
East Orange	Upsala College	Evald B. Lawson
Glassboro	New Jersey State Teachers College	Edgar F. Bunce
Hoboken	Stevens Institute of Technology	Harvey N. Davis
Jersey City	New Jersey State Teachers College	Chris C. Rossey
Jersey City	St. Peter's College	Dennis J. Comey
Lakewood	Georgian Court College	Mother Mary John
Madison	Drew University	Arlo Ayres Brown
Montclair	New Jersey State Teachers College	Harry A. Sprague
Newark	Newark College of Engineering	Allan R. Cullimore
Newark	New Jersey State Teachers College	Roy L. Shaffer
Newark	University of Newark	George H. Black
New Brunswick	New Jersey College for Women	Margaret T. Corwin, Dean
New Brunswick	Rutgers University	Robert C. Clothier
Paterson	New Jersey State Teachers College	C. S. Wightman
Princeton	Princeton Theological Seminary	John A. Mackay
Princeton	Princeton University	Harold W. Dodds
Princeton	St. Joseph's College	Arthur DeC. Hamilton
South Orange	Seton Hall College	James F. Kelley
Trenton	State Teachers College	Roscoe L. West
Zarephath	Alma White College	Arthur K. White

New Mexico

City	Institution	President
Albuquerque	University of New Mexico	J. F. Zimmerman
El Rito	Spanish-American Normal School	Joseph B. Grant
Las Vegas	New Mexico Normal University	Edward Eyring
Silver City	New Mexico State Teachers College	H. W. James
Socorro	New Mexico School of Mines	C. E. Needham
State College	New Mexico State College of Agriculture & Mechanic Arts	Hugh M. Milton II

New York

City	Institution	President
Albany	College of St. Rose	Edmund F. Gibbons
Albany	New York State College for Teachers	John M. Sayles
Alfred	Alfred University	John Nelson Norwood
Annandale-on-Hudson	Bard College, Columbia University	Charles Harold Gray, Dean
Aurora	Wells College	William E. Weld
Brockport	State Normal School	E. C. Hartwell
Bronxville	Sarah Lawrence College	Constance Warren
Brooklyn	Brooklyn College	Harry D. Gideonse
Brooklyn	Long Island University	Tristram W. Metcalfe, Dean
Brooklyn	Polytechnic Institute of Brooklyn	Harry S. Rogers
Brooklyn	Saint Francis College	Brother Columba
Brooklyn	St. John's University	Edward J. Walsh
Buffalo	Canisius College	Francis A. O'Malley
Buffalo	D'Youville College	Sister Grace of the Sacred Heart
Buffalo	State Teachers College	Harry W. Rockwell
Buffalo	University of Buffalo	Samuel Paul Capen, Chancellor
Canton	St. Lawrence University	Millard H. Jencks, Acting
Clinton	Hamilton College	W. H. Cowley
Cortland	Cortland Normal School	H. DeW. DeGroat
Elmira	Elmira College	W. S. A. Pott
Flushing	Queens College	Paul Klapper
Fredonia	State Normal School	L. R. Gregory
Garden City	Adelphi College	Paul Dawson Eddy
Geneseo	State Normal School	James B. Welles
Geneva	Hobart College	William A. Eddy
Hamilton	Colgate University	George B. Cutten
Houghton	Houghton College	Stephen W. Paine
Ithaca	Cornell University	Edmund Ezra Day
Ithaca	Ithaca College	Leonard Bliss Job
Keuka Park	Keuka College	J. Hillis Miller
New Paltz	State Normal School	L. H. van den Berg
New Rochelle	College of New Rochelle	Francis W. Walsh
New York	Barnard College	Virginia C. Gildersleeve, Dean
New York	Biblical Seminary in New York	Horace Ford Martin
New York	College of the City of New York	N. P. Mead, Acting
New York	College of Mount St. Vincent	Francis J. Spellman
New York	Columbia University	Nicholas Murray Butler
New York	Cooper Union	Gano Dunn
New York	Fordham University	Robert I. Gannon
New York	General Theological Seminary	H. E. W. Fosbroke, Dean
New York	Hunter College of the City of N.Y.	George Nauman Shuster
New York	Jewish Theological Seminary of America	Louis Finkelstein
New York	Manhattan College	Brother A. Victor
New York	Manhattanville College of The Sacred Heart	Mother Grace C. Dammann
New York	New York Medical College	Claude A. Burrett
New York	New York University	Harry W. Chase, Chancellor
New York	Savage School for Physical Education	Ella W. Savage
New York	Teachers College, Columbia University	Wm. F. Russell, Dean
New York	Union Theological Seminary	Henry S. Coffin
New York	Yeshiva College	Bernard Revel
Niagara University	Niagara University	Joseph M. Noonan
Oneonta	Hartwick College	Henry J. Arnold
Oneonta	State Normal School	Chas. W. Hunt
Oswego	State Normal School	Ralph W. Swetman
Plattsburg	State Normal School	Charles C. Ward
Potsdam	Clarkson College	John A. Ross, Jr.
Potsdam	State Normal School	Clarence O. Lehman
Poughkeepsie	Vassar College	Henry Noble MacCracken
Rochester	Nazareth College of Rochester	Mother Rose Miriam
Rochester	The Colgate-Rochester Divinity School	Albert W. Beaven
Rochester	University of Rochester	Alan Valentine
St. Bonaventure	St. Bonaventure College	Thomas Plassmann
Saratoga Springs	Skidmore College	Henry T. Moore
Schenectady	Union College	Dixon Ryan Fox
Staten Island	Wagner Memorial Lutheran College	Clarence C. Stoughton
Syracuse	New York State College of Forestry	Samuel N. Spring, Dean
Syracuse	City Normal School	Wm. W. Wright
Syracuse	Syracuse University	W. P. Graham, Chancellor
Tarrytown	Marymount College	Mother M. Gerard
Troy	Rensselaer Polytechnic Institute	Wm. O. Hotchkiss
Troy	Russell Sage College	J. L. Meader
West Point	United States Military Academy	J. L. Benedict
White Plains	Good Counsel College	Mother M. Aloysia

North Carolina

City	Institution	President
Asheville	Asheville Normal & Teachers College	Frank Foster
Boone	Appalachian State Teachers College	B. B. Dougherty
Chapel Hill	University of North Carolina	Frank P. Graham
Charlotte	Johnson C. Smith University	H. L. McCrorey
Charlotte	Queens College	Hunter B. Blakely
Cullowhee	Western Carolina Teachers College	H. T. Hunter
Davidson	Davidson College	Walter L. Lingle
Durham	Duke University	Wm. Preston Few
Durham	North Carolina College for Negroes	James E. Shepard
Elizabeth City	Elizabeth City State Teachers College	Harold L. Trigg
Elon College	Elon College	Leon E. Smith
Fayetteville	Fayetteville State Teachers College	J. W. Seabrook
Greensboro	Agricultural & Technical College	F. D. Bluford
Greensboro	Bennett College	David D. Jones
Greensboro	Greensboro College	Luther L. Gobbel
Greensboro	Woman's College of the University of North Carolina	W. C. Jackson, Dean
Greenville	East Carolina Teachers College	Leon R. Meadows
Guilford College	Guilford College	Clyde A. Milner
Hickory	Lenoir Rhyne College	P. E. Monroe
High Point	High Point College	G. I. Humphreys
Raleigh	Meredith College	Carlyle Campbell
Raleigh	North Carolina State College of Agriculture & Engineering, University of North Carolina	John W. Harrelson, Dean
Raleigh	St. Augustine's College	Edgar H. Goold
Raleigh	Shaw University	Robert P. Daniel
Red Springs	Flora MacDonald College	Henry G. Bedinger
Salisbury	Catawba College	Howard R. Omwake
Salisbury	Livingstone College	W. J. Trent
Wake Forest	Wake Forest College	Thurman D. Kitchin
Wilson	Atlantic Christian College	H. S. Hilley
Winston-Salem	Salem College	H. E. Rondthaler
Winston-Salem	Winston-Salem Teachers College	F. L. Atkins

North Dakota

City	Institution	President
Dickinson	State Teachers College	C. E. Scott
Ellendale	State Normal & Industrial School	J. C. McMillan
Fargo	North Dakota Agricultural College	Frank L. Eversull
Grand Forks	University of North Dakota	John C. West
Grand Forks	Wesley College	T. Ross Hicks
Jamestown	Jamestown College	B. H. Kroeze
Minot	State Teachers College	Carl C. Swain
Valley City	State Teachers College	James E. Cox

Ohio

City	Institution	President
Ada	Ohio Northern University	Robert Williams
Akron	University of Akron	H. E. Simmons
Alliance	Mount Union College	Charles Burgess Ketcham
Ashland	Ashland College	Edward G. Mason
Athens	Ohio University	Herman G. James
Berea	Baldwin-Wallace College	Louis Clinton Wright
Bluffton	Bluffton College	Lloyd L. Ramseyer
Bowling Green	Bowling Green State University	F. J. Prout
Cedarville	Cedarville College	Walter S. Kilpatrick
Cincinnati	Teachers College, Athenaeum of Ohio	Carl J. Ryan, Dean
Cincinnati	University of Cincinnati	Raymond Walters
Cincinnati	Xavier University	Celestin J. Steiner
Cleveland	John Carroll University	Edmund C. Horne
Cleveland	Case School of Applied Science	Wm. E. Wickenden
Cleveland	Fenn College	C. V. Thomas

City	Institution	President
Cleveland	Ursuline College for Women	Mary Concepta Green
Cleveland	Western Reserve University	W. G. Leutner
Columbus	Capital University	Otto Mees
Columbus	The Ohio State University	Howard L. Bevis
Columbus	St. Mary of the Springs College	Sister M. Aloyse
Dayton	University of Dayton	John A. Elbert
Defiance	Defiance College	John W. Claxton
Delaware	Ohio Wesleyan University	Herbert J. Burgstahler
Findlay	Findlay College	H. R. Dunathan
Gambier	Kenyon College	Gordon K. Chalmers
Granville	Denison University	Kenneth Irving Brown
Hiram	Hiram College	Paul H. Fall
Kent	Kent State University	K. C. Leebrick
Manchester	Alfred Holbrook College	Norborne H. Crowell
Marietta	Marietta College	Harry K. Eversull
Mount St. Joseph	College of Mount St. Joseph	Mother Mary Regina
New Concord	Muskingum College	R. N. Montgomery
Oberlin	Oberlin College	Ernest H. Wilkins
Oxford	Miami University	A. H. Upham
Oxford	Western College	Ralph K. Hickok
Painesville	Lake Erie College	Vivian B. Small
South Euclid	Notre Dame College	Mother Mary Evarista
Springfield	Wittenberg College	Rees Edgar Tulloss
Tiffin	Heidelberg College	Clarence E. Josephson
Toledo	Mary Manse College	Sister M. Catherine Raynor
Toledo	De Sales College	Raymond G. Kirsch
Toledo	University of Toledo	Philip Curtis Nash
Westerville	Otterbein College	J. Ruskin Howe
Wilberforce	Wilberforce University	D. O. Walker
Wilmington	Wilmington College	S. Arthur Watson
Wooster	The College of Wooster	Charles F. Wishart
Yellow Springs	Antioch College	A. D. Henderson
Youngstown	Youngstown College	Howard W. Jones

Oklahoma

City	Institution	President
Ada	East Central State Teachers College	A. Linscheid
Alva	Northwestern State College	Charles O. Newlun
Bethany	Bethany-Peniel College	A. K. Bracken
Chickasha	Oklahoma College for Women	M. A. Nash
Durant	Southeastern State Teachers College	T. T. Montgomery
Edmond	Central State College	R. R. Robinson
Enid	Phillips University	Eugene S. Briggs
Goodwell	Panhandle Agricultural & Mechanical College	Edward L. Morrison
Guthrie	Catholic College	Mother Mary Agnes
Langston	Colored Agricultural & Normal University	G. L. Harrison
Norman	University of Oklahoma	Wm. B. Bizzell
Oklahoma City	Oklahoma City University	A. G. Williamson
Shawnee	Oklahoma Baptist University	John W. Raley
Stillwater	Oklahoma Agricultural & Mechanical College	Henry G. Bennett
Tahlequah	Northeastern State Teachers College	John Vaughan
Tulsa	University of Tulsa	C. I. Pontius
Weatherford	Southwestern State College of Diversified Occupations	James B. Boren

Oregon

City	Institution	President
Ashland	Southern Oregon State Normal School	Walter Redford
Corvallis	Oregon State College	F. L. Ballard
Eugene	University of Oregon	Donald Milton Erb
Forest Grove	Pacific University	Walter C. Giersbach
La Grande	Eastern Oregon College of Education	Roben J. Maaske
Marylhurst	Marylhurst College	Sister M. Elizabeth Clare
McMinnville	Linfield College	William Graham Everson
Monmouth	Oregon College of Education	Charles A. Howard
Newberg	Pacific College	Levi T. Pennington
Portland	Albany College	Clarence W. Greene
Portland	North Pacific College of Oregon	Herbert C. Miller
Portland	Reed College	Dexter M. Keezer
Portland	University of Portland	Charles C. Miltner
Salem	Willamette University	Bruce R. Baxter

Pennsylvania

City	Institution	President
Allentown	Cedar Crest College	Wm. F. Curtis
Allentown	Muhlenberg College	Levering Tyson
Annville	Lebanon Valley College	Clyde A. Lynch
Beaver Falls	Geneva College	M. M. Pearce
Bethlehem	Lehigh University	Clement C. Williams
Bethlehem	Moravian College and Theological Seminary	W. N. Schwarze
Bethlehem	Moravian Seminary and College for Women	Edwin J. Heath
Bloomsburg	State Teachers College	Harvey A. Andruss
Bryn Athyn	Academy of the New Church	George de Charms
Bryn Mawr	Bryn Mawr College	Marion E. Park
California	California State Teachers College	Robert M. Steele
Carlisle	Dickinson College	Fred P. Corson
Chambersburg	Wilson College	Paul S. Havens
Chester	Crozer Theological Seminary	James H. Franklin
Chester	Pennsylvania Military College	Frank K. Hyatt
Chestnut Hill	College of Chestnut Hill	Mother Mary James
Cheyney	State Teachers College	L. P. Hill
Clarion	State Teachers College	Paul G. Chandler
Collegeville	Ursinus College	N. E. McClure
Dallas	College Misericordia	Sister Mary Pierre
Easton	Lafayette College	Wm. Mather Lewis
East Stroudsburg	State Teachers College	Joseph F. Noonan
Edinboro	State Teachers College	L. H. Van Houten, Acting
Elizabethtown	Elizabethtown College	Ralph W. Schlosser
Erie	Mercyhurst College	Sister M. de Sales Preston
Erie	Villa Maria College	Joseph J. Wehrle
Gettysburg	Gettysburg College	H. W. A. Hanson
Greensburg	Seton Hill College	J. A. W. Reeves
Greenville	Thiel College	
Grove City	Grove City College	Weir C. Ketler
Haverford	Haverford College	Felix Morley
Huntingdon	Juniata College	Charles C. Ellis
Immaculata	Immaculata College	Francis J. Furey
Indiana	Indiana State Teachers College	Le Roy A. King
Jenkintown	Beaver College	Raymon Kistler
Kutztown	State Teachers College	Quincy A. W. Rohrbach
Lancaster	Franklin & Marshall College	John A. Schaeffer
Latrobe	St. Vincent College	Alfred Koch
Lewisburg	Bucknell University	Arnaud C. Marts
Lincoln Univ.	Lincoln University	Walter L. Wright
Lock Haven	State Teachers College	John G. Flowers
Loretto	St. Francis College	John P. J. Sullivan
Mansfield	State Teachers College	Lester K. Ade
Meadville	Allegheny College	Wm. P. Tolley
Millersville	State Teachers College	Landis Tanger
New Wilmington	Westminster College	Robert F. Galbreath
Philadelphia	Drexel Institute of Technology	Parke R. Kolbe
Philadelphia	Dropsie College for Hebrew and Cognate Learning	Horace Stern, Acting
Philadelphia	Hahnemann Medical College	Joseph S. Conwell
Philadelphia	Jefferson Medical College	Henry K. Mohler, Dean
Philadelphia	La Salle College	Brother E. Anselm
Philadelphia	Philadelphia College of Osteopathy	John G. Keck
Philadelphia	Philadelphia College of Pharmacy & Science	Wilmer Krusen
Philadelphia	St. Joseph's College	Thomas J. Love
Philadelphia	Temple University	Charles E. Beury
Philadelphia	University of Pennsylvania	Thomas S. Gates
Philadelphia	Women's Medical College of Pennsylvania	Chevalier Jackson
Pittsburgh	Carnegie Institute of Technology	R. E. Doherty
Pittsburgh	Duquesne University	J. J. Callahan
Pittsburgh	Mount Mercy College	Mother M. Irenaeus Dougherty
Pittsburgh	Pennsylvania College for Women	Herbert L. Spencer
Pittsburgh	University of Pittsburgh	John G. Bowman, Chancellor
Reading	Albright College	Harry V. Masters
Rosemont	Rosemont College	Mother Mary Cleophas
Scranton	Marywood College	Mother M. Marcella
Scranton	University of Scranton	Brother E. Leonard
Selinsgrove	Susquehanna University	G. Morris Smith
Shippensburg	State Teachers College	A. L. Rowland
Slippery Rock	State Teachers College	Dale McMaster
State College	Pennsylvania State College	Ralph D. Hetzel
Swarthmore	Swarthmore College	John W. Nason
Villanova	Villanova College	E. V. Stanford
Washington	Washington & Jefferson College	Ralph Cooper Hutchison
Waynesburg	Waynesburg College	Paul R. Stewart
West Chester	State Teachers College	Charles S. Swope

Rhode Island

City	Institution	President
Kingston	Rhode Island State College	John Barlow, Acting
Providence	Brown University	Henry M. Wriston
Providence	Providence College	John J. Dillon
Providence	Rhode Island College of Education	Lucius A. Whipple
Providence	Rhode Island College of Pharmacy and Allied Sciences	A. W. Claflin

South Carolina

City	Institution	President
Charleston	The Citadel—The Military College of South Carolina	Chas. P. Summerall
Charleston	College of Charleston	Harrison Randolph
Charleston	Medical College of the State of South Carolina	Robert Wilson
Clemson	The Clemson Agricultural College	Robert Franklin Poole
Clinton	Presbyterian College	William P. Jacobs
Columbia	Allen University	S. R. Higgins
Columbia	Benedict College	J. J. Starks
Columbia	Columbia College	J. Caldwell Guilds
Columbia	University of South Carolina	J. R. McKissick
Due West	Erskine College	Robert C. Grier
Gaffney	Limestone College	R. C. Granberry
Greenville	Furman University	J. L. Plyler
Greenwood	Lander College	J. W. Speake
Hartsville	Coker College	C. Sylvester Green
Newberry	Newberry College	James C. Kinard
Orangeburg	Claflin College	J. B. Randolph
Orangeburg	State Agricultural and Mechanical College	M. F. Whittaker
Rock Hill	Winthrop College	Shelton Phelps
Spartanburg	Converse College	Edward M. Gwathmey
Spartanburg	Wofford College	Henry N. Snyder
Sumter	Morris College	J. P. Garrick

South Dakota

City	Institution	President
Aberdeen	Northern State Teachers College	N. E. Steele
Brookings	South Dakota State College of Agriculture & Mechanic Arts	G. L. Brown
Huron	Huron College	
Madison	Eastern State Normal School	V. A. Lowry
Mitchell	Dakota Wesleyan University	Joseph H. Edge
Rapid City	South Dakota State School of Mines	Joseph P. Connolly
Sioux Falls	Augustana College	Clemens M. Granskou
Sioux Falls	Sioux Falls College	Warren Palmer Behan
Spearfish	Spearfish Normal School	E. C. Woodburn
Springfield	Southern State Normal School	W. A. Thompson
Vermillion	University of South Dakota	I. D. Weeks
Yankton	Yankton College	J. L. McCorison, Jr.

Tennessee

City	Institution	President
Bristol	King College	Thomas P. Johnston
Chattanooga	University of Chattanooga	Archie M. Palmer
Clarksville	Austin Peay Normal School	P. P. Claxton
Cleveland	Bob Jones College	Bob Jones, Jr., Acting
Cookeville	Tennessee Polytechnic Institute	Everett Derryberry
Greeneville	Tusculum College	C. A. Anderson
Harrogate	Lincoln Memorial University	S. W. McClelland
Jackson	Lambuth College	Richard E. Womack
Jackson	Lane College	J. F. Lane
Jackson	Union University	John J. Hurt
Jefferson City	Carson-Newman College	James T. Warren
Johnson City	State Teachers College	C. C. Sherrod
Knoxville	Knoxville College	S. M. Laing
Knoxville	The University of Tennessee	James D. Hoskins
Lebanon	Cumberland University	Ernest L. Stockton
Madison College	Madison College	E. A. Sutherland
Maryville	Maryville College	Ralph Waldo Lloyd
McKenzie	Bethel College	E. K. Reagin
Memphis	Southwestern	Charles E. Diehl
Memphis	State Teachers College	Richard C. Jones
Milligan College	Milligan College	C. E. Burns, Acting
Murfreesboro	State Teachers College	Q. M. Smith
Murfreesboro	Tennessee College	Merrill D. Moore
Nashville	Fisk University	Thomas E. Jones
Nashville	George Peabody College	S. C. Garrison
Nashville	Scarritt College	Jesse Lee Cuninggim
Nashville	Tennessee Agricultural & Industrial State College	W. J. Hale
Nashville	Vanderbilt University	O. C. Carmichael
Sewanee	University of the South	Alexander Guerry

Texas

City	Institution	President
Abilene	Abilene Christian College	Don H. Morris
Abilene	Hardin-Simmons University	W. R. White
Abilene	McMurry College	Frank L. Turner
Alpine	Sul Ross State Teachers College	H. W. Morelock
Austin	Samuel Huston College	Stanley E. Grannum
Austin	St. Edward's University	S. F. Lisewski
Austin	Tillotson College	Mary E. Branch
Austin	The University of Texas	Homer P. Rainey
Belton	Mary Hardin-Baylor College	Gordon G. Singleton
Brownwood	Daniel Baker College	T. H. Hart, Acting
Brownwood	Howard Payne College	Thomas H. Taylor
Canyon	West Texas State Teachers College	J. A. Hill
College Station	Agricultural & Mechanical College of Texas	T. O. Walton
Commerce	East Texas State Teachers College	Sam H. Whitley
Dallas	Southern Methodist University	Umphrey Lee
Denton	North Texas State Teachers College	W. J. McConnell
Denton	Texas State College for Women	Louis H. Hubbard
El Paso	Texas College of Mines and Metallurgy	D. M. Wiggins
Fort Worth	Texas Christian University	Edward McS. Waits
Fort Worth	Texas Wesleyan College	Law Sone
Georgetown	Southwestern University	J. W. Bergin
Houston	The Rice Institute	Edgar Odell Lovett
Huntsville	Sam Houston State Teachers College	C. N. Shaver
Jacksonville	Jacksonville College	J. W. Overall
Kingsville	Texas College of Arts & Industries	J. O. Loftin
Lubbock	Texas Technological College	Clifford B. Jones
Marshall	Bishop College	Joseph J. Rhoads
Marshall	Wiley College	M. W. Dogan
Nacogdoches	Stephen F. Austin State Teachers College	A. W. Birdwell
Prairie View	Prairie View State College	W. R. Banks
San Antonio	Incarnate Word College	Sister M. Columkille
San Antonio	Our Lady of the Lake College	
San Antonio	St. Mary's University	Walter F. Golatka
San Antonio	University of San Antonio	W. W. Jackson
San Marcos	Southwest Texas State Teachers College	C. E. Evans
Sherman	Austin College	Everett B. Tucker
Tyler	Texas College	D. R. Glass
Waco	Baylor University	Pat M. Neff
Waxahachie	Trinity University	F. L. Wear

Utah

City	Institution	President
Logan	Utah State Agricultural College	Elmer G. Peterson
Provo	Brigham Young University	Franklin S. Harris
Salt Lake City	College of St. Mary-of-the-Wasatch	Sister Mary Agnes
Salt Lake City	University of Utah	George Thomas

Vermont

City	Institution	President
Bennington	Bennington College	Robert D. Leigh
Burlington	Trinity College, Inc.	Sister Mary Emmanuel
Burlington	University of Vermont and State Agricultural College	Guy W. Bailey
Castleton	State Normal School	Ermo Houston Scott
Johnson	State Normal School	Donald W. McClelland
Middlebury	Middlebury College	Paul D. Moody
Northfield	Norwich University	John M. Thomas
Winooski Park	St. Michael's College	James H. Petty

Virginia

City	Institution	President
Alexandria	Protestant Episcopal Theological Seminary in Virginia	A. C. Zabriskie, Dean
Ashland	Randolph-Macon College	J. Earl Moreland
Blacksburg	Virginia Polytechnic Institute	Julian A. Burruss
Bridgewater	Bridgewater College	Paul H. Bowman
Charlottesville	University of Virginia	John Lloyd Newcomb
Emory	Emory & Henry College	J. N. Hillman
Ettrick	Virginia State College for Negroes	John M. Gandy
Farmville	State Teachers College	J. L. Jarman
Fredericksburg	Mary Washington College	Morgan L. Combs
Hampden-Sydney	Hampden-Sydney College	Edgar G. Gammon
Hampton	Hampton Institute	Malcolm S. Maclean
Harrisonburg	Madison College	S. P. Duke
Hollins College	Hollins College	Bessie C. Randolph
Lawrenceville	St. Paul Normal and Industrial School	J. A. Russell
Lexington	Virginia Military Institute	Chas. E. Kilbourne, Supt.
Lexington	Washington & Lee University	Francis P. Gaines
Lynchburg	Lynchburg College	R. B. Montgomery
Lynchburg	Randolph-Macon Woman's College	Theo. Henley Jack
Lynchburg	Virginia Theological Seminary and College	W. H. R. Powell
Radford	State Teachers College at Radford	David W. Peters
Richmond	Medical College of Virginia	William T. Sanger
Richmond	University of Richmond	F. W. Boatwright
Richmond	Virginia Union University	William J. Clark
Salem	Roanoke College	Chas. J. Smith
Staunton	Mary Baldwin College	L. Wilson Jarman
Sweet Briar	Sweet Briar College	Meta Glass
Williamsburg	College of William & Mary	John Stewart Bryan

Washington

City	Institution	President
Bellingham	Western Washington College of Education	W. W. Haggard
Cheney	Eastern Washington College of Education	Ralph E. Tieje
College Place	Walla Walla College	George W. Bowers
Ellensburg	Central Washington College of Education	Rob't E. McConnell
Lacey	St. Martin's College	Lambert Burton
Pullman	State College of Washington	Ernest O. Holland
Seattle	Seattle Pacific College	Charles H. Watson
Seattle	University of Washington	Lee Paul Sieg
Spokane	Gonzaga University	Leo J. Robinson
Spokane	Holy Names College	Sister Esther Mary
Spokane	Whitworth College	Frank F. Warren
Tacoma	College of Puget Sound	Edward H. Todd
Walla Walla	Whitman College	Walter A. Bratton

West Virginia

City	Institution	President
Athens	Concord State Teachers College	J. Frank Marsh
Bethany	Bethany College	W. H. Cramblet
Bluefield	Bluefield State Teachers College	Henry Lake Dickason
Buckhannon	West Virginia Wesleyan College	Roy McCuskey
Charleston	Morris Harvey College	Leonard Riggleman
Elkins	Davis & Elkins College	R. T. L. Liston
Fairmont	Fairmont State Teachers College	Joseph Rosier
Glenville	Glenville State Teachers College	E. G. Rohrbough
Harpers Ferry	Storer College	H. T. McDonald
Huntington	Marshall College	James E. Allen
Institute	West Virginia State College	John W. Davis
Montgomery	New River State College	E. S. Maclin
Morgantown	West Virginia University	Charles E. Lawall
Philippi	Alderson-Broaddus College	John Wesley Elliott
Salem	Salem College	S. Orestes Bond
Shepherdstown	Shepherd State Teachers College	W. H. S. White
West Liberty	West Liberty State Teachers College	Paul N. Elbin

Wisconsin

City	Institution	President
Appleton	Lawrence College	Thomas N. Barrows
Ashland	Northland College	J. D. Brownell
Beloit	Beloit College	Irving Maurer
Eau Claire	State Teachers College	H. A. Schofield
La Crosse	State Teachers College	Rexford S. Mitchell
La Crosse	Viterbo College	Mother M. Engelberta
Madison	Edgewood Teachers College of the Sacred Heart	Sister Rose Catherine
Madison	University of Wisconsin	Clarence A. Dykstra
Menomonie	The Stout Institute	Burton E. Nelson
Milton	Milton College	J. G. Meyer
Milwaukee	Marquette University	Raphael C. McCarthy
Milwaukee	Milwaukee-Downer College	Lucia R. Briggs
Milwaukee	Mount Mary College	Edw. A. Fitzpatrick
Milwaukee	State Teachers College	Frank E. Baker
Nashotah	Nashotah House	E. J. M. Nutter
Oshkosh	State Teachers College	Forrest R. Polk
Platteville	State Teachers College	Asa M. Royce
Plymouth	Mission House College	Paul Grosshuesch
Ripon	Ripon College	Silas Evans
River Falls	State Teachers College	J. H. Ames
Stevens Point	State Teachers College	
Superior	State Teachers College	Jim Dan Hill
Watertown	Northwestern College	Erwin E. Kowalke
Waukesha	Carroll College	G. T. Vander Lugt
West De Pere	St. Norbert College	B. H. Pennings
Whitewater	State Teachers College	C. M. Yoder

Wyoming

City	Institution	President
Laramie	University of Wyoming	Arthur G. Crane

Possessions

City	Institution	President
College, Alaska	University of Alaska	Charles E. Bunnell
Honolulu, Hawaii	University of Hawaii	David L. Crawford
Dumaguete, Philippine Islands	Silliman University	Arthur L. Carson
Manila, Philippine Islands	De La Salle College	Brother Xavier
Manila, Philippine Islands	Mapua Institute of Technology	Tomas Mapua
Manila, Philippine Islands	Philippine Normal School	R. K. Gilmore, Supt.
Manila, Philippine Islands	University of the Philippines	B. M. Gonzalez
Rio Piedras, Puerto Rico	University of Puerto Rico	Juan B. Soto

Canada

City	Institution	President
Antigonish, N. S.	St. Francis Xavier University	D. J. MacDonald
Charlottetown, P. E. I.	St. Dunstan's College	J. A. Murphy
Edmonton, Alta.	University of Alberta	W. A. R. Kerr
Fredericton, N. B.	University of New Brunswick	Norman A. M. MacKenzie
Halifax, N. S.	Dalhousie University	Carleton Stanley
Halifax, N. S.	Halifax Ladies College	E. Florence Blackwood
Halifax, N. S.	University of King's College	A. Stanley Walker
Hamilton, Ont.	McMaster University	H. P. Whidden, Chancellor
Kingston, Ont.	Queen's University	R. C. Wallace
Lennoxville, Que.	Bishop's University	A. H. McGreer
London, Ont.	University of Western Ontario	Wm. Sherwood Fox
Montreal, Que.	Loyola College	E. M. Brown
Montreal, Que.	McGill University	Frank Cyril James
Montreal, Que.	Université de Montréal	Olivier Maurault
Ottawa, Ont.	University of Ottawa Normal School	René Lamoureux
Quebec, Que.	Laval University	Camille Roy
Quebec, Que.	Ursuline College	Sister S. Clotilde
St. Joseph, N. B.	St. Joseph's University	L. LaPalme
Saskatoon, Sask.	University of Saskatchewan	James S. Thomson
Toronto, Ont.	University of Toronto	H. J. Cody
Toronto, Ont.	Upper Canada College	T. W. L. MacDermot
Toronto, Ont.	Victoria University	E. W. Wallace
Truro, N. S.	Nova Scotia Agricultural College	Lyman T. Chapman
Vancouver, B. C.	University of British Columbia	Leonard S. Klinck
Winnipeg, Man.	University of Manitoba	Sidney E. Smith
Winnipeg, Man.	United College	W. C. Graham
Wolfville, N. S.	Acadia University	F. W. Patterson

SECTION XIV

PRESIDENTS OF JUNIOR COLLEGES

Alabama

City	Institution	President
Boaz	Snead Junior College	Joseph Warren Broyles
Jasper	Walker Junior College	C. A. Jesse
Marion	Marion Institute	Walter L. Murfee
Normal	State Agricultural and Mechanical Institute	J. F. Drake
St. Bernard	St. Bernard College	Boniface Seng
Wadley	Southern Union College	Ross E. Ensminger

Arizona

City	Institution	President
Phoenix	Phoenix Junior College	E. W. Montgomery
Thatcher	Gila Junior College	Monroe H. Clarke

Arkansas

City	Institution	President
Beebe	Junior Agricultural College of Central Arkansas	B. E. Whitmore
Conway	Central College	O. J. Wade
El Dorado	El Dorado Junior College	Eleanor Gilliam, Dean
Fort Smith	Fort Smith Junior College	J. W. Ramsey
Little Rock	Dunbar Junior College	John H. Lewis
Little Rock	Little Rock Junior College	J. A. Larson
Magnolia	Agricultural & Mechanical College	C. A. Overstreet
Russellville	Arkansas Polytechnic College	J. W. Hull

California

City	Institution	President
Arlington	La Sierra College	E. E. Cossentine
Auburn	Placer Junior College	John H. Napier, Jr.
Azusa	Citrus Junior College	F. S. Hayden
Bakersfield	Bakersfield Junior College	Grace V. Bird
Berkeley	Armstrong College	J. Evan Armstrong
Berkeley	Williams Junior College	J. W. Hopkins
Brawley	Brawley Junior College	Percy E. Palmer, Principal
Coalinga	Coalinga Extension Center	T. A. Ellestad, Supt. of Schools
Compton	Compton Junior College	O. Scott Thompson
Deep Springs	Deep Springs Junior College	L. A. Kimpton, Dean
El Centro	Central Junior College	Guy A. Weakley, Principal
Fresno	Fresno City Junior College	Frank W. Thomas
Fullerton	Fullerton Junior College	Louis E. Plummer, Supt. of Schools
Glendale	Glendale Junior College	George H. Geyer, Dean
Hollister	San Benito County Junior College	James P. Davis, Principal
Kentfield	Marin Junior College	A. C. Olney
Lancaster	Antelope Valley Junior College	David J. Roach
Long Beach	Long Beach Junior College	John L. Lounsbury
Los Angeles	Holmby College	Frederica de Laguna
Los Angeles	Los Angeles City College	Rosco C. Ingalls
Los Angeles	Los Angeles Pacific College	W. C. Mavis
Marysville	Yuba Junior College	Pedro Osuna
Menlo Park	Menlo Junior College	Lowry S. Howard
Modesto	Modesto Evening Junior College	H. K. Ouimet
Modesto	Modesto Junior College	Dwight C. Baker
Oakland	California Concordia College	Theodore Brohm
Oceanside	Oceanside–Carlsbad Junior College	Ralph I. Hale, Supt. of Schools
Ontario	Chaffey Junior College	Gardiner W. Spring
Pasadena	Pasadena Junior College	John W. Harbeson
Pomona	Pomona Junior College	J. E. Walker
Porterville	Porterville Junior College	B. E. Jamison, Dean
Reedley	Reedley Junior College	J. O. McLaughlin
Riverside	Riverside Junior College	Arthur G. Paul
Sacramento	Sacramento Junior College	R. E. Rutledge
Salinas	Salinas Evening Junior College	Helen E. Ward, Principal
Salinas	Salinas Junior College	Richard J. Werner
San Bernardino	San Bernardino Valley Union Junior College	Nicholas Ricciardi
San Diego	San Diego Evening Junior College	J. M. Greig, Dean
San Diego	San Diego Vocational Junior College	Eliot F. Landon, Principal
San Francisco	Cogswell Polytechnical College	Robert W. Dodd
San Francisco	Lick-Wilmerding-Lux Schools	Ward H. Austin
San Francisco	San Francisco Junior College	A. J. Cloud
San Jose	San Jose District Junior College	T. W. MacQuarrie
San Luis Obispo	San Luis Obispo Junior College	Henry A. Cross, Dean
San Mateo	San Mateo Junior College	Charles S. Morris
Santa Ana	Santa Ana Junior College	D. K. Hammond
Santa Maria	Santa Maria Junior College	Andrew P. Hill
Santa Monica	Santa Monica Junior College	Elmer C. Sandmeyer
Santa Rosa	Santa Rosa Junior College	Floyd P. Bailey
Stockton	Stockton Junior College	Dwayne Orton
Susanville	Lassen Junior College	N. H. McCollom
Taft	Taft Junior College	Stanford Hannah
Upland	Beulah College	Arthur M. Climenhaga
Ventura	Ventura Junior College	D. R. Henry
Visalia	Visalia Junior College	L. J. Williams, Principal

Colorado

City	Institution	President
Denver	Bellevue Junior College	Elsie Cinnamon, Principal
Denver	Colorado Woman's College	James E. Huchingson
Grand Junction	Mesa College	Horace J. Wubben
Hesperus	Fort Lewis Branch, Colorado State College of Agriculture	Roy M. Green
Lamar	The Junior College of Southeastern Colorado	James H. Buchanan, Director
Pueblo	Pueblo Junior College	Charles Haines
Trinidad	Trinidad State Junior College	George J. Kabat

Connecticut

City	Institution	President
Bloomfield	St. Thomas Seminary	Joseph M. Griffin
Bridgeport	Junior College of Connecticut	E. Everett Cortright
Hartford	Hillyer Junior College	Alan S. Wilson
Hartford	Morse Junior College	Wesley E. Morse
New Haven	Junior College of Commerce	Samuel W. Tator
New Haven	Junior College of Physical Therapy	Harry Eaton Stewart
New Haven	Larson Junior College	George V. Larson
New Haven	New Haven Y.M.C.A. College	Lawrence L. Bethel
New London	New London Junior College	Richard P. Saunders
Thompson	Marot Junior College	Mary L. Marot
West Hartford	Hartford Junior College	Grace Frick, Dean

District of Columbia

City	Institution	President
Washington	Chevy Chase Junior College	Kendric N. Marshall
Washington	Columbia Junior College	B. G. Wilkinson
Washington	The Columbus University Junior College	Francis J. Mullen, Dean
Washington	Fairmont Junior College	Maud van Woy
Washington	Georgetown Visitation Junior College	Sister Jane Frances Leibell
Washington	Gunston Hall	Mary B. Kerr, Principal
Washington	Holton-Arms Junior College	Jessie Moon Holton
Washington	Immaculata Junior College	Sister St. Philomene
Washington	Marjorie Webster Schools, Inc.	Marjorie F. Webster
Washington	Mount Vernon Seminary and Junior College	George W. Lloyd

Florida

City	Institution	President
Daytona Beach	Bethune-Cookman College	Mary McLeod Bethune
Jacksonville	Edward Waters College	Howard D. Gregg
St. Augustine	Florida Normal and Industrial Institute	N. W. Collier
St. Petersburg	St. Petersburg Junior College	Robert B. Reed
Sarasota	Ringling School of Art	Verman Kimbrough
West Palm Beach	Palm Beach Junior College	John I. Leonard

Georgia

City	Institution	President
Americus	Georgia Southwestern College	Peyton Jacob
Augusta	Junior College of Augusta	Eric W. Hardy
Barnesville	Gordon Military College	J. E. Guillebeau
Carrollton	West Georgia College	I. S. Ingram
Cochran	Middle Georgia College	L. H. Browning
Cuthbert	Andrew College	S. C. Olliff
Dahlonega	North Georgia College	Jonathan C. Rogers
Douglas	South Georgia College	J. M. Thrash
Milledgeville	Georgia Military College	J. H. Jenkins
Mount Vernon	Brewton-Parker Institute	A. M. Gates
Norman Park	Norman Junior College	Paul Carroll
Oxford	Emory At Oxford	George S. Roach, Division Executive
Rabun Gap	Rabun Gap-Nacoochee School	George C. Bellingrath
Savannah	Armstrong Junior College	Ernest A. Lowe
Tifton	Abraham Baldwin Agricultural College	G. H. King
Valdosta	Emory Junior College	A. Hollis Edens
Waleska	Reinhardt College	W. M. Bratton
Young Harris	Young Harris College	T. Jack Lance

Idaho

City	Institution	President
Boise	Boise Junior College	Eugene B. Chaffee
Coeur d'Alene	North Idaho Junior College	Orrin E. Lee
Pocatello	University of Idaho, Southern Branch	J. R. Nichols, Exec. Dean
Rexburg	Ricks College	Hyrum Wilkins Manwaring

Illinois

City	Institution	President
Carlinville	Blackburn College	William M. Hudson
Chicago	Austin Evening Junior College	Hobart H. Sommers, Dean
Chicago	Carl Schurz Evening Junior College	Robert C. Keenan, Dean
Chicago	Englewood Evening College	Matthew L. Fitzgerald, Dean
Chicago	Chicago Junior College	Wm. H. Johnson
Chicago	Morgan Park Junior College	Albert G. Dodd, Dean
Chicago	North Park College	Algoth Ohlson
Chicago	Woodrow Wilson Junior College	John A. Bartky, Dean
Chicago	Wright Junior College	W. H. Conley, Dean
Cicero	Morton Junior College	William P. MacLean
Des Plaines	Maine Township Junior College	Edward Morgan, Dean
Elgin	Elgin Academy and Junior College	Earl G. Leinbach
Evanston	Evanston Collegiate Institute	T. Otmann Firing
Godfrey	Monticello College	George Irwin Rohrbough
Harvey	Thornton Township Junior College	William E. McVey
Joliet	Joliet Junior College	Clarence Lee Jordan
La Grange	Lyons Township Junior College	Ross Holt, Dean
Lake Forest	Ferry Hall Junior College	Eloise R. Tremain
La Salle	La Salle-Peru-Oglesby Junior College	Frank A. Jensen
Lincoln	Lincoln College	Wm. D. Copeland
Mt. Carroll	Frances Shimer Junior College	A. C. Bro
Springfield	Springfield Junior College	Mother M. Barbara
Wilmette	Mallinkrodt College	Mother Sebastian

Indiana

City	Institution	President
Fort Wayne	Concordia College	Ottomar Krueger
Gary	Gary College	Herbert S. Jones
Kokomo	Kokomo Junior College	Hurd Allyn Drake
Vincennes	Vincennes University Junior College	Walter A. Davis

Iowa

City	Institution	President
Albia	Albia Junior College	Donald O. Smith, Dean
Bloomfield	Bloomfield Junior College	E. T. Carlstedt, Dean
Boone	Boone Junior College	J. R. Thorngren, Dean
Britt	Britt Junior College	L. J. Thies, Supt. of Schools
Burlington	Burlington Junior College	Robert White, Jr.
Cedar Rapids	Mount Mercy Junior College	Sister Mary Maura
Centerville	Centerville Junior College	E. W. Fannon, Supt. of Schools
Chariton	Chariton Junior College	F. A. Lunan, Dean
Clarinda	Clarinda Junior College	Herbert L. Glynn
Clinton	Mount St. Clare Junior College	Mother M. Paul Carrico
Creston	Creston Junior College	Burton R. Jones, Supt. of Schools
Des Moines	Dowling College	J. J. Boylan
Des Moines	Grand View College	Alfred C. Nielsen
Eagle Grove	Eagle Grove Junior College	Gerald Shepherd, Dean
Elkader	Elkader Junior College	George Manus
Emmetsburg	Emmetsburg Junior College	R. W. Newell, Supt. of Schools
Estherville	Estherville Junior College	Warner Kirlin, Dean
Forest City	Waldorf College	J. L. Rendahl
Fort Dodge	Fort Dodge Junior College	Harris Dickey, Dean
Hopkinton	Lenox College	Orville E. Eckberg
Independence	Independence Junior College	F. E. Mueller, Dean
Iowa Falls	Ellsworth Junior College	Arthur L. Williams, Dean
Lamoni	Graceland College	George N. Briggs
Maquoketa	Maquoketa Junior College	E. L. Miller, Dean
Marshalltown	Marshalltown Junior College	B. R. Miller
Mason City	Mason City Junior College	James Rae
Muscatine	Muscatine Junior College	Willetta Strahan, Dean
Orange City	Northwestern Junior College	Jacob Heemstra
Osceola	Osceola Junior College	H. F. Glidden, Dean
Ottumwa	Ottumwa Heights College	Mother Mary Geraldine Upham
Red Oak	Red Oak Junior College	J. R. Inman
Sheldon	Sheldon Junior College	W. C. Jackman
Tipton	Tipton Junior College	H. C. DeKock, Supt. of Schools
Washington	Washington Junior College	Harland W. Mead
Waukon	Waukon Junior College	B. K. Orr
Webster City	Webster City Junior College	W. D. Wesselink, Dean

Kansas

City	Institution	President
Arkansas City	Arkansas City Junior College	C. E. St. John
Chanute	Chanute Junior College	W. W. Bass, Dean
Coffeyville	Coffeyville Junior College	W. M. Ostenberg, Dean
Dodge City	Dodge City Junior College	R. C. Hunt, Dean
El Dorado	El Dorado Junior College	Earl Walker, Dean
Fort Scott	Fort Scott Junior College	W. S. Davison, Dean
Garden City	Garden City Junior College	J. R. Jones, Dean
Haviland	Friends Bible College	Charles A. Beals
Hays	St. Joseph's College and Military Academy	Alfred Carney
Hesston	Hesston College & Bible School	Milo Franklin Kauffman
Highland	Highland Junior College	C. M. Rankin, Dean
Hillsboro	Tabor College	Abraham E. Janzen
Hutchinson	Hutchinson Junior College	C. M. Lockman, Dean
Independence	Independence Junior College	E. R. Stevens, Dean
Iola	Iola Junior College	R. H. Carpenter
Kansas City	Kansas City Junior College	J. F. Wellemeyer
Kansas City	Western University	Dan C. Matthews, Supt.
McPherson	Central College	Orville S. Walters
Miltonvale	Miltonvale Wesleyan College	C. Floyd Hester
Paola	College of Paola	Mother M. Jerome Schaub
Parsons	Parsons Junior College	E. F. Farner, Dean
Pratt	Pratt Junior College	H. B. Unruh
Wichita	Sacred Heart Junior College	Leon A. McNeill
Winfield	St. John's College	Carl S. Mundinger

Kentucky

City	Institution	President
Ashland	Ashland Junior College	Herbert Hazel
Campbellsville	Campbellsville College	D. J. Wright
Columbia	Lindsey Wilson Junior College	Aaron P. White
Hopkinsville	Bethel Woman's College	Kenneth R. Patterson
Jackson	Lees Junior College	J. O. Van Meter
London	Sue Bennett College	Kenneth C. East
Louisville	Ursuline College	Mother M. Roberta
Maple Mount	Mount St. Joseph Junior College	Sister M. Christina, Dean
Nazareth	Nazareth Junior College and Academy	Sister Margaret Gertrude, Dean
Paducah	Paducah Junior College	R. G. Matheson, Jr.,
Pikeville	Pikeville College	A. A. Page, Dean
Pippapass	Caney Junior College	Charles H. Houghton
St. Catherine	St. Catherine Junior College	Mother Mary Louis
Williamsburg	Cumberland College	James L. Creech

Louisiana

City	Institution	President
Grand Coteau	College of the Sacred Heart	Mother M. Erskine
Lake Charles	John McNeese Junior College of Louisiana State University	W. B. Nash, Acting Director
Monroe	Northeast Junior College	C. C. Colvert, Dean
Shreveport	Dodd College	M. E. Dodd, Chairman of the Board

Maine

City	Institution	President
Houlton	Ricker Junior College	Roy M. Hayes
Portland	Portland Junior College	Luther I. Bonney
Portland	Westbrook Junior College	Milton D. Proctor

Maryland

City	Institution	President
Baltimore	Junior College, University of Baltimore	Theodore Halbert Wilson
Baltimore	Mt. St. Agnes Junior College	Sister M. Placide Thomas
Baltimore	Mt. St. Joseph's College High School	Brother Oswald
Catonsville	St. Charles College	George A. Gleason
Forest Glen	National Park College	Roy T. Davis
Port Deposit	Tome Junior College of Administration	Trentwell Mason White
St. Mary's City	St. Mary's Female Seminary—Junior College	M. Adele France

Massachusetts

City	Institution	President
Auburndale	Lasell Junior College	Guy M. Winslow
Boston	Burdett College	C. F. Burdett
Boston	Chamberlayne Junior College	Theresa F. Leary
Boston	Erskine College	Edith A. Richardson, Director
Boston	The Garland School	Gladys Beckett Jones
Boston	Stratford School	Matthew Malloy
Boston	Stuart School	Beatrice L. Williams, Director
Bradford	Bradford Junior College	Dorothy M. Bell
Cambridge	Cambridge School of Liberal Arts	Irving T. Richards, Director
Dudley	Nichols Junior College	James L. Conrad
Newton Center	Mt. Ida Junior College	William Fitts Carlson
Pride's Crossing	Endicott Junior College	George O. Bierkoe
Springfield	Bay Path Institute	Charles F. Gaugh
Waltham	The Junior College of Middlesex University	C. Ruggles Smith
Wellesley	Pine Manor Junior College	Mrs. Marie W. Potter
Worcester	Worcester Junior College	W. Albert Lotz

Michigan

City	Institution	President
Bay City	Bay City Junior College	George E. Butterfield Dean
Big Rapids	Ferris Institute Junior College	Roy Newton, Dean
Dearborn	Fordson Junior College	Kenneth M. MacLeod, Dean
Flint	Flint Junior College	W. S. Shattuck, Dean
Grand Rapids	Grand Rapids Junior College	Arthur Andrews
Hancock	Suomi College	V. K. Nikander
Highland Park	Highland Park Junior College	George I. Altenburg, Dean
Ironwood	Gogebic Junior College	R. Ernest Dear, Dean
Jackson	Jackson Junior College	H. A. Steele
Muskegon	Muskegon Junior College	A. G. Umbreit
Port Huron	Port Huron Junior College	John H. McKenzie
Spring Arbor	Spring Arbor Seminary & Junior College	LeRoy M. Lowell

Minnesota

City	Institution	President
Albert Lea	Albert Lea Junior College	Clair Jordan, Dean
Brainerd	Brainerd Junior College	Emil Heintz
Coleraine	Itasca Junior College	Joseph B. Davis, Dean
Crosby	Crosby-Ironton Junior College	Thomas W. Simons
Duluth	Duluth Junior College	R. D. Chadwick, Dean
Ely	Ely Junior College	Sigurd F. Olson
Eveleth	Eveleth Junior College	O. H. Gibson
Hibbing	Hibbing Junior College	H. A. Drescher
Mankato	Bethany Lutheran College	S. C. Ylvisaker
Rochester	Rochester Junior College	R. W. Goddard
St. Paul	Bethel Junior College	Emery A. Johnson, Dean
St. Paul	Concordia College	Martin Graebner
Tracy	Tracy Junior College	E. H. Stock
Virginia	Virginia Junior College	Floyd B. Moe, Dean
Worthington	Worthington Junior College	Marvin C. Knudson, Dean

Mississippi

City	Institution	President
Brookhaven	Whitworth College	Sinclair Daniel
Clinton	Hillman College	M. P. L. Berry
Decatur	East Central Junior College	L. O. Todd
Edwards	Southern Christian Institute	John Long
Ellisville	Jones County Junior College	James Gonnard Young
Goodman	Holmes Junior College	R. M. Branch
Gulfport	Gulf Park College	Richard G. Cox
Mathiston	Wood Junior College	Edward W. Seay
Meridian	Meridian Junior College	J. L. McCaskill, Principal
Moorhead	Sunflower Junior College	Paul M. West
Newton	Clarke Memorial College	F. E. May
Okolona	Okolona Industrial School	Richard T. Middleton
Perkinston	Harrison-Stone-Jackson Junior College	C. J. Darby
Poplarville	Pearl River Junior College	R. E. L. Sutherland
Raymond	Hinds Junior College	G. M. McLendon
Scooba	East Mississippi Junior College	J. M. Tubb
Senatobia	Northwest Mississippi Junior College	R. C. Pugh
Summit	Southwest Mississippi Junior College	J. M. Kenna
Vicksburg	All Saints' Episcopal College	W. G. Christian, Rector
Wesson	Copiah Lincoln Junior College	James M. Ewing
West Point	Mary Holmes Seminary and Junior College	Graham F. Campbell

Missouri

City	Institution	President
Bolivar	Southwest Baptist College	Courts Redford
Boonville	Kemper Military School	A. M. Hitch
Columbia	Christian College	J. C. Miller
Columbia	Stephens College	James M. Wood
Conception	Conception Junior College	Stephen Schappler
Concordia	St. Paul's College	Albert J. C. Moeller
Flat River	Junior College of Flat River	W. A. Deneke
Fulton	William Woods College	H. G. Harmon
Hannibal	Hannibal-LaGrange Junior College	W. A. Kleckner, Acting
Iberia	Iberia Junior College	G. Byron Smith
Jefferson City	Jefferson City Junior College	G. J. Linker
Joplin	Joplin Junior College	E. A. Elliott
Kansas City	College of St. Teresa	Sister M. Simplicia
Kansas City	Kansas City Junior College	A. M. Swanson
Kansas City	Lincoln Junior College	H. O. Cook
Lexington	Wentworth Military Academy	J. M. Sellers
Moberly	Moberly Junior College	M. F. Beach
Monett	Monett Junior College	H. D. McEachen
Nevada	Cottey Junior College for Women	Marjorie Mitchell
St. Joseph	St. Joseph Junior College	Nelle Blum, Dean
St. Louis	Notre Dame Junior College	Sister Mary Chrysologa
Trenton	Trenton Junior College	S. M. Rissler
Warrenton	Central Wesleyan College	C. A. Greene

Montana

City	Institution	President
Great Falls	Great Falls Junior College	James Donovan
Havre	Northern Montana College	G. H. Vande Bogart
Miles City	Custer County Junior College	G. H. Gloege, Dean

Nebraska

City	Institution	President
Hebron	Hebron College and Academy	K. F. Weltner
McCook	McCook Junior College	F. L. Holmes
Omaha	College of Saint Mary	Mother M. Gerard
Scottsbluff	Scottsbluff Junior College	J. E. Shedd
Wahoo	Luther College	Paul M. Lindberg

New Hampshire

City	Institution	President
New London	Colby Junior College	H. Leslie Sawyer
Rye Beach	Stoneleigh College	Richard D. Currier
Tilton	Tilton Junior College	James E. Coons

New Jersey

City	Institution	President
Belmar	The King's College	Percy B. Crawford
Camden	The College of South Jersey	Arthur E. Armitage
Hackettstown	Centenary Junior College	Robert J. Trevorrow
Long Branch	Monmouth Junior College	Edward G. Schlaefer, Dean
Morristown	Morris Junior College	Arthur S. Platt
Newark	Essex Junior College	Adolph M. Koch
Newark	Newark Junior College	David Bucharest
Newark	Whitman Junior College	Cecelia Kemberton
Paterson	College of Paterson	Herbert S. Robinson
Perth Amboy	Middlesex Junior College	Ladd M. Lukats, Dean
Roselle	Union Junior College	Charles G. Cole
Teaneck	Bergen Junior College	C. L. Littel

New Mexico

City	Institution	President
Portales	Eastern New Mexico College	Donald W. MacKay
Roswell	New Mexico Military Institute	D. C. Pearson

New York

City	Institution	President
Briarcliff Manor	Briarcliff Junior College	Doris L. Flick
Bronxville	Concordia Collegiate Institute	Arthur J. Doege
Brooklyn	The Packer Collegiate Institute	Paul D. Shafer
Cazenovia	Cazenovia Seminary and Junior College	Burritt C. Herrington
Millbrook	Bennett Junior College	Courtney Carroll
New York	Finch Junior College	Jessica G. Cosgrave
New York	Packard School	Louis A. Rice

North Carolina

City	Institution	President
Asheville	Biltmore College	C. A. Lloyd
Asheville	St. Genevieve-of-the-Pines	Mother A. Foret
Banner Elk	Lees-McRae College	Edgar H. Tufts
Belmont	Belmont Abbey College	Cuthbert E. Allen, Rector
Belmont	Sacred Heart Junior College	Sister M. Raphael
Boiling Springs	Boiling Springs Junior Baptist College	John R. Cantrell
Brevard	Brevard College	Eugene J. Coltrane
Buies Creek	Campbell College	L. H. Campbell
Concord	Barber-Scotia Junior College	L. S. Cozart
Greensboro	Immanuel Lutheran College	Henry Nan
Louisburg	Louisburg College	Walter Patten
Mars Hill	Mars Hill College	Hoyt Blackwell
Maxton	Presbyterian Junior College for Men, Inc.	Louis C. La Motte
Misenheimer	Pfeiffer Junior College	W. S. Sharp
Montreat	Montreat College	R. C. Anderson
Murfreesboro	Chowan Junior College	J. L. Carrick
Oak Ridge	Oak Ridge Military Institute	E. P. Holt
Raleigh	Peace Junior College	William C. Pressly
Raleigh	St. Mary's School & Junior College	Mrs. Ernest Cruikshank
Salemburg	Pineland College and Edwards Military Institute	W. J. Jones
Statesville	Mitchell College	Grace Kirkpatrick Ramsay
Wingate	Wingate Junior College	Craven Cullen Burris

North Dakota

City	Institution	President
Bismarck	Bismarck Junior College	Walter J. Swensen
Bottineau	North Dakota School of Forestry	A. F. Arnason
Wahpeton	North Dakota State School of Science	E. F. Riley

Ohio

City	Institution	President
Columbus	Office Training School	R. E. Hoffhines
Dayton	Dayton Y.M.C.A. College	Gwynne H. McConaughy
Oberlin	Oberlin School of Commerce	J. H. Kutscher
Tiffin	Tiffin University	F. J. Miller
Toledo	The Junior College of the University of Toledo	Raymond L. Carter
Urbana	Urbana Junior College	Russell Eaton

Oklahoma

City	Institution	President
Altus	Altus Junior College	A. G. Steele
Bacone	Bacone Junior College	B. D. Weeks
Bartlesville	Bartlesville Junior College and High School	Paul C. Norvell
Bristow	Bristow Junior College	E. H. Black
Carnegie	Carnegie Junior College	B. F. Johnson
Claremore	Oklahoma Military Academy	Richard E. Anderson
Duncan	Duncan Junior College	N. L. George
El Reno	El Reno Junior College	Paul R. Taylor
Frederick	Tillman County Junior College	J. O. Shaw
Hobart	Kiowa County Junior College	B. A. McElyea
Lawton	Cameron State Agricultural College	Charles M. Conwill
Miami	Northeastern Oklahoma Junior College	Sabin C. Percefull
Muskogee	Muskogee Junior College	Bessie M. Huff, Dean
Oklahoma City	Oklahoma City Junior College	H. E. Wrinkle
Okmulgee	Okmulgee Junior College	W. Max Chambers
Sapulpa	Sapulpa Junior College	James L. Prince
Sayre	Oklahoma Western Junior College	Oscar McMahan
Seminole	Seminole Junior College	John G. Mitchell
Shawnee	St. Gregory's College	Mark F. Braun
Shidler	Shidler Junior College	M. B. Nelson
Tishomingo	Murray State School of Agriculture	Clive E. Murray
Tonkawa	University Preparatory School & Junior College	Loren N. Brown
Tulsa	Monte Cassino Junior College	Sister M. Ursula
Warner	Connors State Agricultural College	Jacob Johnson
Wilburton	Eastern Oklahoma A. & M. College	C. C. Dunlap
Woodward	Woodward Junior College	R. R. Russell

Oregon

City	Institution	President
Portland	Multnomah College	Edward L. Clark

Pennsylvania

City	Institution	President
Altoona	Altoona Undergraduate Center	R. E. Eiche
Bryn Mawr	Harcum Junior College	Edith H. Harcum
Cambridge Springs	Alliance College	John J. Kolasa
Chambersburg	Penn Hall Junior College & Preparatory School	Frank S. Magill
DuBois	The DuBois Undergraduate Center	Edwin W. Zoller, Administrative Head
Erie	Erie Center, University of Pittsburgh	J. Lloyd Mahoney, Head
Erie	St. John Kanty College	Stephen Krol
Grantham	Messiah Bible College	C. N. Hostetter, Jr.
Harrisburg	Harrisburg Academy and Junior College	Frank C. Baldwin
Hazleton	Hazleton Undergraduate Center, The Pennsylvania State College	Coleman Herpel, Administrative Head
Hershey	Hershey Junior College	A. G. Breidenstine, Dean
Johnstown	Johnstown Center, University of Pittsburgh	Viers W. Adams, Head
La Plume	Scranton-Keystone Junior College	Byron S. Hollinshead
Lititz	Linden Hall Junior College	F. W. Stengel
Pottsville	Schuylkill Undergraduate Center, The Pennsylvania State College	R. Wallace Brewster
Rydal	Ogontz Junior College	Abby A. Sutherland
Swarthmore	Wildcliff Junior College	H. M. Crist, Director
Washington	Washington Seminary	Mrs. E. K. Maxfield
Wayne	Valley Forge Military Junior College	Milton G. Baker
Wilkes-Barre	Bucknell University Junior College	Eugene S. Farley, Director
Williamsport	Williamsport Dickinson Seminary and Junior College	John W. Long
Wyomissing	Wyomissing Polytechnic Institute	Arthur C. Harper

South Carolina

City	Institution	President
Anderson	Anderson College	Annie D. Denmark
Central	Wesleyan Methodist College	John F. Childs
Charleston	Avery Institute	Frank A. DeCosta
Cheraw	Coulter Memorial Academy	George Waldo Long
Denmark	Voorhees Junior College	J. E. Blanton

City	Institution	President
Rock Hill	Clinton Normal and Industrial College	Edward Warner Brice
Rock Hill	Friendship Junior College	James H. Goudlock
Spartanburg	Textile Industrial Institute	R. B. Burgess
Tigerville	North Greenville Junior College	M. C. Donnan
Trenton	Bettio Academy and Junior College	A. W. Nicholson

South Dakota

City	Institution	President
Freeman	Freeman Junior College	John D. Unruh
Mitchell	Notre Dame Junior College	J. M. Brady
Wessington Springs	Wessington Springs College	W. A. Harden
Yankton	Mt. Marty Junior College	Mother M. Jerome

Tennessee

City	Institution	President
Athens	Tennessee Wesleyan College	James L. Robb
Collegedale	Southern Junior College	J. C. Thompson
Henderson	Freed-Hardeman College	N. B. Hardeman
Madisonville	Hiwassee College	T. A. Frick
Martin	The University of Tennessee Junior College	Paul Meek
Morristown	Morristown College	J. W. Haywood
Nashville	David Lipscomb College	E. H. Ijams
Nashville	Trevecca Nazarene College	A. B. Mackey
Nashville	Ward-Belmont School	Joseph E. Burk
Pulaski	Martin College	Keener L. Rudolph
Rogersville	Swift Memorial Junior College	W. C. Hargrave

Texas

City	Institution	President
Amarillo	Amarillo College	J. F. Mead
Arlington	North Texas Agricultural College	E. E. Davis, Dean
Beaumont	Lamar College	C. W. Bingman
Brenham	Blinn College	Charles F. Schmidt
Brownsville	Brownsville Junior College	E. C. Dodd
Clarendon	Clarendon Junior College	H. T. Burton
Clifton	Clifton Junior College	C. Tyssen
Corpus Christi	Corpus Christi Junior College	R. B. Fisher
Crockett	Mary Allen Junior College	T. B. Jones
Dallas	Hockaday Junior College	Ela Hockaday
Decatur	Decatur Baptist College	J. L. Ward
Edinburg	Edinburg Junior College	R. P. Ward, Director
Fort Worth	Our Lady of Victory College	Sister M. Albertine
Gainesville	Gainesville Junior College	H. O. McCain
Goose Creek	Lee Junior College	N. S. Holland
Hillsboro	Hillsboro Junior College	L. W. Hartsfield
Houston	University of Houston	E. E. Oberholtzer
Jacksonville	Lon Morris College	C. E. Peeples
Keene	Southwestern Junior College	H. H. Hamilton
Kerrville	Schreiner Institute	J. J. Delaney
Kilgore	Kilgore College	B. E. Masters, Dean
Marshall	College of Marshall	F. S. Groner
Paris	Paris Junior College	J. R. McLemore
Plainview	Wayland College	G. W. McDonald
Ranger	Ranger Junior College	William T. Walton
San Angelo	San Angelo College	Wilson H. Elkins
San Antonio	San Antonio Junior College	J. E. Nelson
San Antonio	St. Philip's Junior College and Vocational School	A. Bowden
Seguin	Texas Lutheran College	Wm. F. Kraushaar
Stephenville	John Tarleton Agricultural College	J. Thomas Davis, Dean
Tehuacana	Westminster College	Clarence A. Sutton
Temple	Temple Junior College	Joe R. Humphrey
Terrell	Texas Military College	Mrs. Louis C. Perry
Texarkana	Texarkana Junior College	H. W. Stilwell
Tyler	Butler College	Isaiah Jackson
Tyler	Tyler Junior College	J. M. Hodges
Victoria	Victoria Junior College	J. H. Bankston
Weatherford	Weatherford College	G. C. Boswell
Wichita Falls	Hardin Junior College	H. D. Fillers

Utah

City	Institution	President
Cedar City	Branch Agriculture College	E. G. Peterson
Ephraim	Snow College	James A. Nuttall
Ogden	Weber College	H. A. Dixon
Price	Carbon College	Elden B. Sessions
St. George	Dixie Junior College	Glenn E. Snow
Salt Lake City	Westminster College	Robert D. Steele

Vermont

City	Institution	President
Montpelier	Vermont Junior College	John H. Kingsley
Plainfield	Goddard College	Royce Stanley Pitkin
Poultney	Green Mountain Junior College	Jesse P. Bogue

Virginia

City	Institution	President
Arlington	Arlington Hall Junior College	Carrie Sutherlin
Blackstone	Blackstone College for Girls	J. Paul Glick
Bluefield	Bluefield College	Edwin C. Wade
Bristol	Sullins College	W. E. Martin
Bristol	Virginia Intermont College	H. G. Noffsinger
Buena Vista	Southern Seminary & Junior College	Robert Lee Durham
Danville	Averett College	Curtis Vance Bishop
Danville	Stratford College	John C. Simpson
Dayton	Shenandoah College	Wade S. Miller
Ferrum	Ferrum Junior College	J. A. Chapman
Harrisonburg	Eastern Mennonite School	John L. Stauffer
Marion	Marion College	Hugh J. Rhyne
Norfolk	Norfolk Division, College of William and Mary	W. T. Hodges, Dean
Waynesboro	Fairfax Hall Junior College	W. B. Gates

Washington

City	Institution	President
Aberdeen	Grays Harbor Junior College	Lewis C. Tidball
Centralia	Centralia Junior College	Margaret Corbet
Longview	Lower Columbia Junior College	T. D. Schindler
Mount Vernon	Mount Vernon Junior College	Charles H. Lewis
Parkland	Pacific Lutheran College	O. A. Tingelstad
Spokane	Spokane Junior College	G. H. Schlauch
Vancouver	Clark Junior College	Lewis D. Cannell, Dean
Wenatchee	Wenatchee Junior College	W. B. Smith
Yakima	Yakima Valley Junior College	Elizabeth Prior

West Virginia

City	Institution	President
Beckley	Beckley College	D. K. Shoyer, Bus. Mgr.
Keyser	Potomac State School of West Virginia University	E. E. Church
Lewisburg	Greenbrier College	French W. Thompson

Wisconsin

City	Institution	President
Beaver Dam	Wayland Junior College	Stanley C. Ross
Milwaukee	Concordia College	Leroy C. Rincker
Mt. Calvary	St. Lawrence Junior College	Alexis Gore
St. Nazianz	Salvatorian Seminary	S. B. Freischmidt

Canal Zone

City	Institution	President
Balboa	Canal Zone Junior College	Sigurd E. Esser, Dean

Canada

City	Institution	President
Calgary, Alta.	Mount Royal Junior College	George W. Kerby

SECTION XV
HEADS OF PRIVATE SCHOOLS

Alabama

City	Institution	Head
Fairhope	School of Organic Education	S. W. Alexander
Mobile	University Military School	William S. Pape
Thorsby	Thorsby Institute	Helen C. Jenkins

California

City	Institution	Head
Berkeley	Anna Head School	T. R. Hyde
Beverly Hills	Berkeley Hall School	Mary E. Stevens
Claremont	Webb School of California	Thompson Webb
Culver City	Pacific Military Academy	Leon C. High
La Jolla	The Bishop's School	Caroline S. Cummins
Los Angeles	Cumnock School	Raymond C. Brooks
Los Angeles	Marlborough School for Girls	Ada S. Blake
Los Angeles	Urban Academy, Inc.	P. G. McDonnell
Los Angeles	Westlake School for Girls	Frederica de Laguna
Los Gatos	Montezuma Mt. Ranch School	E. A. Rogers
North Hollywood	Harvard School	Robert B. Gooden
Pacific Beach	Brown Military Academy	Charles Bain
Palo Alto	Castilleja School	Richard Lockey
Palo Alto	Miss Harker's School	Sara D. Harker
Pasadena	Westridge School for Girls	Anne F. Parker
San Francisco	Miss Burke's School	Barbara Burke
San Francisco	Drew School	John S. Drew
San Francisco	Sarah Dix Hamlin School	Mrs. E. B. Stanwood
San Rafael	San Rafael Military Academy	Robert U. Ricklefs
San Rafael	The Tamalpais School	Charles J. Keppel

Colorado

City	Institution	Head
Colorado Springs	Fountain Valley School	Francis Mitchell Froelicher
Denver	Kent School for Girls	Mary A. Bogue

Connecticut

City	Institution	Head
Avon	Avon Old Farms	W. Brooke Stabler
Cheshire	Cheshire Academy	Arthur N. Sheriff
Clinton	Morgan School	Floyd Gilbert Wood
Farmington	Miss Porter's School	Robert Porter Keep
Greenwich	Brunswick School	William L. Henry
Greenwich	The Edgewood School	Euphrosyne E. Langley
Greenwich	Greenwich Academy	Ruth West Campbell
Greenwich	Rosemary Hall	Mrs. R. R. Evers, Mrs. H. H. Jessup
Hartford	Oxford School	Mrs. Vachel Lindsay
Kent	Kent School	Frederick H. Sill
Lakeville	Hotchkiss School	George Van Santvoord
Middlebury	Westover School	Louise B. Dillingham
Milford	The Milford School	William D. Pearson
New Haven	Collegiate School	Arthur Pite
New Haven	The Day School	Julia B. Thomas
New Haven	Hamden Hall Country Day School	E. Stanley Taylor
New Haven	Hopkins Grammar School	George B. Lovell
New London	Bulkeley School	Homer K. Underwood
New Milford	Canterbury School	Nelson Hume
Norwich	Norwich Free Academy	George E. Shattuck
Pomfret	Pomfret School	Halleck Lefferts
Rowayton	The Thomas School	Mabel Thomas
Salisbury	Salisbury School	Emerson B. Quaile
Simsbury	Ethel Walker School	Mrs. Elliott Speer
Simsbury	Westminster School	Arthur Milliken
South Kent	South Kent School	Samuel S. Bartlett
Stamford	The King School	V. A. Dwelle
Stamford	Low-Heywood School	Mary R. Roper
Suffield	Suffield Academy	John F. Scherechewsky
Wallingford	The Choate School	George St. John
Washington	The Gunnery School	Tertius van Dyke
Washington	Wykeham Rise School	Elsie Lanier
Waterbury	St. Margaret's School	Alberta C. Edell
Watertown	The Taft School	Paul F. Cruikshank
West Hartford	Kingswood School	G. R. H. Nicholson
Windsor	The Loomis School	N. H. Batchelder
Winsted	The Gilbert School	Henry S. Moseley

Delaware

City	Institution	Head
Middletown	St. Andrew's School	Walden Pell 2nd
Wilmington	Friends School	Wilmot R. Jones
Wilmington	Tower Hill School	Burton P. Fowler

District of Columbia

City	Institution	Head
Washington	Dunbarton College	Mother M. Rose Elizabeth
Washington	Emerson Institute	John J. Humphrey
Washington	Georgetown Visitation Convent	Sister Margaret Mary Sheerin
Washington	Gunston Hall	Mary B. Kerr
Washington	Holton-Arms School and Junior College	Mrs. Jessie M. Holton
Washington	Immaculata Seminary and Junior College	Sister St. Philomene
Washington	National Cathedral School	Mabel B. Turner
Washington	St. Albans	Albert H. Lucas
Washington	Sidwell Friends School	Albert E. Rogers

Florida

City	Institution	Head
Jacksonville	The Bolles School	Roger M. Painter
Miami	Miss Harris' Florida School	Julia F. Harris
Miami Beach	Coburn School	Nelson Coburn
Orlando	Cathedral School for Girls	Mrs. Louise C. Massey
Palm Beach	Palm Beach Private School	Karl B. Dearborn
St. Leo	St. Leo College Prep School	Francis Sadlier
St. Petersburg	Aikin Open Air School	Mrs. Dean Aikin
St. Petersburg	Florida Military Academy	W. B. Mendels

Georgia

City	Institution	Head
Atlanta	North Avenue Presbyterian School	Thyrza S. Askew
Atlanta	Peacock School for Boys	J. H. Peacock
Atlanta	University School for Boys	W. E. Dendy
Atlanta	Washington Seminary	Emma B. Scott
College Park	Georgia Military Academy	William R. Brewster
Gainesville	Riverside Military Academy	Sandy Beaver
Oxford	Emory at Oxford	George S. Roach
Rome	Darlington School	C. R. Wilcox
Savannah	Pape School	Nina A. Pape

Illinois

City	Institution	Head
Aledo	Roosevelt Military Academy	Karl J. Stouffer
Alton	Western Military Academy	C. L. Persing
Chicago	Chicago Latin School	James O. Wood
Chicago	The Faulkner School	Elizabeth Faulkner
Chicago	The Girls Latin School of Chicago	Elizabeth Singleton
Chicago	Harvard School for Boys	Elsie Schobinger, Charles E. Pence
Chicago	Loring School	Cecilia Russell
Chicago	Luther Institute	John O. Anderson
Chicago	Morgan Park Military Academy	Hugh G. Price
Chicago	Francis W. Parker School	Herbert W. Smith
Chicago	Starrett School for Girls	Gerard T. Smith
Chicago	Stickney School	Stanley M. Durrant
Chicago	University High School	P. B. Jacobson
Elgin	Elgin Academy	Earl G. Leinbach
Evanston	Marywood School	Sister Margaret Agnes
Evanston	Roycemore School	Rebecca S. Ashley
La Grange	Broadview Academy	A. J. Olson
Lake Forest	Ferry Hall	Eloise R. Tremain
Lake Forest	Lake Forest Academy	John W. Richards
Mooseheart	Mooseheart School	W. J. Leinweber
Onarga	Onarga Military School	J. E. Bittinger

City	Institution	Head
Rock Island	Villa De Chantal	Sister Marie
Winnetka	The North Shore Country Day School	Perry D. Smith

Indiana

City	Institution	Head
Culver	Culver Military Academy	W. E. Gregory
Howe	Howe School	Burrett B. Bouton
Indianapolis	Tudor Hall School	I. Hilda Stewart

Iowa

City	Institution	Head
Dubuque	Loras Academy	N. C. Barrett

Kansas

City	Institution	Head
Salina	St. John's Military School	R. L. Clem, Supt.

Kentucky

City	Institution	Head
Lexington	Sayre School for Girls	J. C. Hanley
Louisville	Kentucky Home School for Girls	Annie S. Anderson
Louisville	Louisville Collegiate Institute	Dorothy Graff
Lyndon	Kentucky Military Institute	N. C. Hodgin
Millersburg	Millersburg Military Institute	W. R. Nelson
Shelbyville	Science Hill School	Juliet J. Poynter

Louisiana

City	Institution	Head
New Orleans	Gilbert Academy	Margaret Davis Bowen
New Orleans	Louise S. McGehee School	Nina P. Davis
New Orleans	Metairie Park Country Day School	Ralph E. Boothby
New Orleans	Isidore Newman School	C. C. Henson

Maine

City	Institution	Head
Bethel	Gould Academy	Elwood F. Ireland
Charleston	Higgins Classical Institute	Wm. A. Tracy
Dover-Foxcroft	Foxcroft Academy	C. E. Wood
Fryeburg	Fryeburg Academy	Elroy O. LaCasce
Houlton	Ricker Classical Institute & Junior College	R. M. Hayes
Kents Hill	Kents Hill School	Edward W. Hincks
North Bridgton	Bridgton Academy	H. H. Sampson
Pittsfield	Maine Central Institute	Edwin M. Purinton
Portland	The Waynflete School	Barbara Woodruff Freeman
Saco	Thornton Academy	Hollis A. Sanderson
South Berwick	Berwick Academy	Ercell M. Gordon
Vassalboro	Oak Grove School	Robert Owen
Waterville	Coburn Classical Institute	Hugh A. Smith

Maryland

City	Institution	Head
Baltimore	Boys' Latin School	Frederick A. Hahn
Baltimore	Bryn Mawr School	Katherine Van Bibber
Baltimore	Friends School	Edwin C. Zavitz
Baltimore	Gilman Country School	E. Boyd Morrow
Baltimore	Girls' Latin School	Lillian M. Kloppel
Baltimore	Mount St. Agnes School	Sister Mary Kathleen
Baltimore	Notre Dame of Maryland School	Sister Mary Coeline
Baltimore	Park School	Hans Froelicher, Jr.
Baltimore	Roland Park Country School	Elizabeth M. Castle
Catonsville	St. Timothy's School	Ella R. Watkins
Charlotte Hall	Charlotte Hall School	M. D. Burgee
Garrett Park	Georgetown Preparatory School	Robert P. Arthur
Garrison	Garrison Forest School	Jean G. Marshall
Glencoe	Oldfields School, Inc.	Duncan McCulloch
McDonogh	McDonogh School	Louis E. Lamborn
Port Deposit	The Tome School	Trentwell Mason White
Reisterstown	The Hannah More Academy	Laura Fowler
Ruxton	Greenwood School	Mary A. Elcock
St. James	St. James School	James B. Drake
Severna Park	Severn School	Rolland M. Teel
Towson	Loyola High School	John A. Convery

Massachusetts

City	Institution	Head
Andover	Abbot Academy	Marguerite Hearsey
Andover	Phillips Academy	Claude Moore Fuess
Ashburnham	Cushing Academy	Clarence P. Quimby
Belmont	Belmont Hill School	Thomas R. Morse
Boston	Boston Academy of Notre Dame	Sister Teresa
Boston	The Brimmer & May School	Mabel H. Cummings
Boston	Chauncy Hall School	Franklin T. Kurt
Boston	Erskine School	Edith A. Richardson
Boston	Huntington School for Boys	Charles H. Sampson
Boston	The Winsor School	Frances Dorwin Dugan
Brookline	Choate School	Augusta Choate
Brookline	The Rivers School	Clarence E. Allen
Cambridge	The Browne & Nichols School	Geoffrey W. Lewis
Cambridge	The Buckingham School	Marian W. Vaillant
Cambridge	Manter Hall School	J. C. Hall
Cambridge	The New Preparatory School	Ernest Benshimol
Chestnut Hill	The Beaver Country Day School	Eugene R. Smith
Concord	Concord Academy	J. Josephine Tucker
Concord	Middlesex School	Lawrence Terry
Danvers	St. John's Preparatory School	Brother Aloysius
Dedham	Noble & Greenough School	Charles Wiggins, II
Deerfield	Deerfield Academy	Frank L. Boyden
Easthampton	Williston Academy	Archibald V. Galbraith
East Northfield	Northfield Seminary	Mira B. Wilson
Franklin	Dean Academy	Earle S. Wallace
Groton	Groton School	John Crocker
Groton	Lawrence Academy	Fred Clifton Gray
Hingham	Derby Academy	H. M. Davis, Jr.
Kendall Green	The Cambridge School, Inc.	John R. P. French
Lowell	Rogers Hall	Katharine W. McGay
Marion	Tabor Academy	Walter H. Lillard
Milton	Milton Academy	Wm. L. W. Field
Mt. Hermon	Mount Hermon School	David R. Porter
Natick	Walnut Hill School	Hester R. Davies
Newton	The Country Day School for Boys	W. Linwood Chase
North Andover	Brooks School	Frank D. Ashburn
Norton	House in the Pines	Mrs. G. C. Milliken
Pittsfield	Miss Hall's School	Margaret H. Hall
Sheffield	Berkshire School	Seaver B. Buck
Southborough	St. Mark's School	Francis Parkman
South Braintree	Thayer Academy	Stacy B. Southworth
South Byfield	Governor Dummer Academy	Edward W. Eames
Springfield	The MacDuffie School	M. A. MacDuffie
Wellesley	Academy of the Assumption	Sister Maris Stella
Wellesley	Dana Hall Schools	Helen Temple Cooke
West Bridgewater	Howard Seminary	Mary A. Bradford
Weston	The Cambridge School	John R. P. French
West Roxbury	The Roxbury Latin School	George N. Northrop
Wilbraham	Wilbraham Academy	Charles L. Stevens
Worcester	Bancroft School	Bradford M. Kingman
Worcester	Worcester Academy	Harold H. Wade

Michigan

City	Institution	Head
Bloomfield Hills	Cranbrook School	R. D. Lindquist
Bloomfield Hills	Kingswood School Cranbrook	Margaret A. Augur
Grosse Pointe Woods	Detroit University School	C. O. Page
Detroit	The Liggett School	Katharine Ogden
Detroit	Miss Newman's School	Mary Newman

Minnesota

City	Institution	Head
Duluth	Stanbrook Hall	Sister Raymond
Faribault	St. Mary's Hall	Margaret Robertson
Faribault	Shattuck School	Donald Henning
Hopkins	The Blake School	Eugene C. Alder
Minneapolis	Minnehaha Academy	E. O. Franklin
Minneapolis	Northrop Collegiate School	Ethel M. Spurr
Owatonna	Pillsbury Academy	G. R. Strayer
St. Paul	Oak Hall	Royal A. Moore
St. Paul	St. Paul Academy	John DeQ. Briggs
St. Paul	The Summit School	Sarah Converse

Mississippi

City	Institution	Head
Blue Mountain	Mississippi Heights Academy	J. E. Brown
Gulfport	Gulf Coast Military Academy	Nat Owen
Port Gibson	Chamberlain-Hunt Academy	J. W. Kennedy

Missouri

City	Institution	Head
Boonville	Kemper Military School	A. M. Hitch
Clayton	John Burroughs School	Leonard D. Haertter
Clayton	Chaminade College Academy	Valentine B. Braun
Columbia	University High School	L. G. Townsend
Kansas City	Barstow School	Winifred H. Turner
Kansas City	Pembroke-Country Day School	Howard E. A. Jones
Kansas City	Sunset Hill School	Mrs. Orville C. Green
Lexington	Wentworth Military Academy	L. H. Ungles
Mexico	Missouri Military Academy	Marquess Wallace
Point Lookout	The School of the Ozarks	R. M. Good
St. Louis	Mary Institute	Charles H. Garrison
St. Louis	The Principia	Frederic E. Morgan
St. Louis	St. Louis Country Day School	Robert H. B. Thompson

Nebraska

City	Institution	Head
Omaha	Brownell Hall	Marguerite H. Wickenden
Omaha	Pratt School of Individual Instruction	Mrs. C. F. Pratt

New Hampshire

City	Institution	Head
Andover	Proctor Academy	J. Halsey Gulick
Center Strafford	Austin-Cate Academy	Edmond J. Houle
Concord	St. Paul's School	Norman B. Nash
Derry	Pinkerton Academy	Stanley W. Wright
Exeter	Phillips Exeter Academy	Lewis Perry
Exeter	Robinson Seminary	James A. Pirnie
Kingston	Sanborn Seminary	Raymond A. Hoyt
Meriden	Kimball Union Academy	William R. Brewster
New Hampton	New Hampton	Frederick Smith
Wolfeboro	Brewster Free Academy	Walter G. Grennall, Jr.

New Jersey

City	Institution	Head
Blairstown	Blair Academy	Charles H. Breed
Bordentown	Bordentown Military Institute	H. M. Smith, J. H. Lucas, & D. Styer
Burlington	St. Mary's Hall	Florence Lukens Newbold
Convent	Academy of St. Elizabeth	Sister Marie Josephine
Elizabeth	Pingry School	E. Laurence Springer
Elizabeth	The Vail-Deane School	Eleanor Denison
Englewood	Dwight School	Frances Leggett, Mrs. Charles W. Hulst
Essex Falls	Kingsley School	Paul C. McPherson
Gladstone	St. Bernard's School	H. D. Nicholls
Hightstown	Peddie School	Wilbour E. Saunders
Hoboken	Stevens Hoboken Academy	B. F. Carter
Jersey City	Bergen School for Girls	Catalina Van Cleef
Lakewood	The Newman School	Xavier Prum
Lawrenceville	The Lawrenceville School	Allan V. Heely
Montclair	The Kimberley School	Helen Burtt Mason
Montclair	Montclair Academy	Walter D. Head
Moorestown	Moorestown Friends School	Chester L. Reagan
Morristown	Morristown School	Earl N. Evans
Newark	Newark Academy	H. Paul Abbott
Newark	Newark Preparatory School	Leon Terry
Newark	Prospect Hill School	Albert A. Hamblon
New Brunswick	Rutgers Preparatory School	Stanley Shepard, Jr.
Orange	Miss Beard's School	Lucie C. Beard
Pennington	Pennington School	Francis Harvey Green
Pine Beach	Admiral Farragut Academy	S. S. Robison, Supt.
Plainfield	The Hartridge School, Inc.	Frances A. Hurrey
Plainfield	Wardlaw School	C. D. Wardlaw
Princeton	Miss Fine's School	Katherine B. Shippen
Princeton	Hun School	John G. Hun
Summit	Kent Place School	Harriet L. Hunt
West Orange	Carteret School for Boys	Eugene M. Hinton

New York

City	Institution	Head
Albany	Academy of the Holy Names	Sister Mary Isabella
Albany	The Albany Academy	Harold T. Stetson, Acting
Albany	Albany Academy for Girls	Margaret Trotter
Albany	St. Agnes School	Blanche Pittman
Bronxville	Brantwood Hall School	Winnifred Brown
Brooklyn	Adelphi Academy	William Slater
Brooklyn	Berkeley Institute	Ina C. Atwood
Brooklyn	Brooklyn Academy	Chas. W. Cortright
Brooklyn	Brooklyn Friends School	Douglas G. Grafflin
Brooklyn	Brooklyn Preparatory School	John H. Klocke
Brooklyn	Colby Academy	Walter S. Meyer
Brooklyn	Polytechnic Preparatory Country Day School	Joseph Dana Allen
Brooklyn	Shore Road Academy	Theodora Goldsmith
Buffalo	The Buffalo Seminary	L. Gertrude Angell
Buffalo	The Franklin School	Janet Crawford
Buffalo	The Nichols School of Buffalo	Philip M. B. Boocock
Carmel	Drew Seminary for Young Women	Herbert E. Wright
Cooperstown	Knox School	Mrs. Russell Houghton
Cornwall	New York Military Academy	Frank A. Patillo
Flushing	The Foxwood School	Mrs. Elizabeth C. Dresser
Forest Hills	Kew-Forest School	Louis D. Marriott
Garden City	Cathedral School of St. Mary	Marion B. Reid
Garden City	St. Paul's School	Walter R. Marsh
Jackson Heights	Garden Country Day School	O. P. Flower
Lake Placid Club	Northwood School	Ira A. Flinner
Lima	Genesee Wesleyan Seminary	J. Wesley Searles, Acting
Locust Valley	Friends Academy	Harold A. Nomer
Manlius	The Manlius School	Norman S. Waldron
Montour Falls	Cook Academy	William S. Fisher
New Hartford	Utica Country Day School	Raymond B. Johnson
New York	Academy of Mount Saint Vincent	Sister Mary Angelica
New York	All Hallows Institute	Brother C. S. McManus
New York	Barnard School for Boys	William L. Hazen
New York	Barnard School for Girls	Margaret D. Gillette
New York	Bentley School	Bertha M. Bentley
New York	Birch Wathen School	Louise Birch, Edith Wathen
New York	The Brearley School, Ltd.	Mrs. Rustin McIntosh
New York	The Calhoun School	Mary E. Calhoun, Ella C. Levis
New York	The Chapin School, Ltd.	Ethel G. Stringfellow
New York	Collegiate School	Wilson Parkhill
New York	Columbia Grammar School	Frederic A. Alden
New York	Corpus Christi School	George Fox
New York	The Dalton School	Helen Parkhurst
New York	Ethical Culture Schools	V. T. Thayer
New York	Franklin School	David P. Berenberg, Clifford W. Hall
New York	Friends Seminary	S. Archibald Smith
New York	The Gardner School, Inc.	M. Elizabeth Masland
New York	The Lenox School	Olivia Green
New York	Lincoln School	John R. Clark, Acting
New York	Horace Mann School	Rollo G. Reynolds
New York	Horace Mann School for Boys	Charles C. Tillinghast
New York	McBurney School	Thomas Hemenway
New York	New York Preparatory School	Ernest Greenwood
New York	Rhodes School	David Goodman
New York	The Riverside School, Inc.	Margaret E. Wells
New York	St. Agatha	Matthew E. Dann
New York	St. Ann's Academy	Brother Marcel Henry
New York	The Scudder School	James E. Lough
New York	Spence School	Mrs. Harold S. Osborne
New York	Trinity School	Matthew E. Dann
New York	Walden School	Hannah Falk
Niagara Falls	DeVeaux School	George L. Barton, Jr.
Oakdale	La Salle Military Academy	Brother Ambrose
Pawling	The Pawling School	R. J. Shortlidge
Peekskill	Peekskill Military Academy	John C. Bucher
Peekskill	St. Mary's School	Sister Mary Regina
Poughkeepsie	Oakwood School	William J. Reagan
Riverdale	Riverdale Country School	Frank S. Hackett
Rochester	Allendale School	John R. Webster
Rochester	Columbia School	Della E. Simpson
Rochester	The Harley School	Louise M. Sumner
Rye	Rye Country Day School	Morton Snyder
Scarborough	Scarborough School	F. Dean McClusky
Schenectady	The Brown School	Amy Kermeth
Snyder	The Park School of Buffalo	M. Adolphus Cheek, Jr.
Staten Island	Notre Dame Academy	Mother St. Mary Catharine
Staten Island	Staten Island Academy	Stephen J. Botsford
Stony Brook	The Stony Brook School	Frank E. Gaebelein
Syracuse	Goodyear-Burlingame School	Marion S. Edwards
Tarrytown	The Hackley School	Madison Grant
Tarrytown	Highland Manor School	Eugene H. Lehman
Tarrytown	Irving School	C. W. Olson
Tarrytown	Marymount School	Mother M. St. Clare
Troy	Emma Willard School	Eliza Kellas
Troy	La Salle Institute	Brother Raymond
Woodmere	Woodmere Academy	Horace M. Perry

North Carolina

City	Institution	Head
Asheville	Asheville School	David R. Fall
Asheville	St. Genevieve-of-the-Pines	Mother A. Foret
Buie's Creek	Campbell College	L. H. Campbell
Hendersonville	Fassifern School	Joseph R. Sevier
Oak Ridge	Oak Ridge Military Institute	T. O. Wright
Winston Salem	Salem Academy	Mary A. Weaver

North Dakota

City	Institution	Head
Fargo	Oak Grove Seminary	T. H. Quanbeck

Ohio

City	Institution	Head
Akron	Old Trail School	Philip S. Sayles
Barnesville	Friends Boarding School	Blanche E. Schofield
Cincinnati	College Preparatory School	Ruth R. Jones
Cincinnati	Hillsdale School	Miss Florence E. Fessenden
Cincinnati	University School	C. L. S. Easton
Cleveland	Hathaway-Brown School	Anne Cutter Coburn
Cleveland	Laurel School	Edna F. Lake
Cleveland	University School	Harry A. Peters
Columbus	Columbus Academy	Frank P. R. Van Syckel
Columbus	Columbus School for Girls	Samuel Shellabarger
Hudson	Western Reserve Academy	Joel B. Hayden
Maumee	Maumee Valley Country Day School	Willis W. Stork
Mt. St. Joseph	Mt. St. Joseph Academy	Sister Dorothea
Mt. Vernon	Mt. Vernon Academy	C. C. Morris
Reading	Mount Notre Dame Academy	Sister Eleanor Josephine

Oregon

City	Institution	Head
Gaston	Laurelwood Academy	G. H. Simpson
Portland	The Catlin School	Mrs. J. T. Powers
Portland	Hill Military Academy	Joseph A. Hill
Portland	St. Helen's Hall	Sister W. Lucia

Pennsylvania

City	Institution	Head
Birmingham	The Grier School	Thomas C. Grier
Bryn Mawr	The Baldwin School	Rosamond Cross
Bryn Mawr	The Shipley School	Alice G. Howland
Forty Fort	The Wilkes-Barre Day School	Harold L. Cruikshank
George School	George School	George A. Walton
Harrisburg	The Harrisburg Academy	Frank C. Baldwin
Haverford	Haverford School	Cornelius B. Boocock
Hollidaysburg	Highland Hall	Elizabeth G. Baldwin
Kingston	Wyoming Seminary	Wilbur H. Fleck
Lancaster	Franklin & Marshall Academy	E. M. Hartman
Lancaster	The Shippen School	Eleanor Fitzpatrick
Latrobe	St. Xavier Academy	Sister M. Fabian
Mercersburg	The Mercersburg Academy	Boyd Edwards
New Bloomfield	Carson Long Institute	Edward L. Holman
Overbrook	The Episcopal Academy	Greville G. Haslam
Overbrook	Friends Central School	Barclay L. Jones
Pennsburg	Perkiomen School	Clarence E. Tobias, Jr.
Philadelphia	Academy of the Sacred Heart	Mother H. Moclair
Philadelphia	Brown Preparatory School	A. Linn Myers
Philadelphia	Carson College for Orphan Girls	Elsa Ueland
Philadelphia	Chestnut Hill Academy	Charles Platt, Jr.
Philadelphia	Friends' Select School	Harris G. Haviland
Philadelphia	Germantown Academy	Samuel E. Osbourn
Philadelphia	Germantown Friends School	Stanley R. Yarnall
Philadelphia	Lankenau School for Girls	E. F. Bachmann
Philadelphia	Mount St. Joseph Academy	Mother Saint Ursula
Philadelphia	Oak Lane Country Day School	George H. Ivins
Philadelphia	William Penn Charter School	Richard Knowles
Philadelphia	Springside School	Mrs. Samuel H. Paul
Philadelphia	The Stevens School	Helen L. Church
Philadelphia	Temple University High School	H. E. Harting
Pittsburgh	Arnold School	Roger B. Merriman, Jr.
Pittsburgh	The Ellis School	Sara Frazer Ellis
Pittsburgh	Shady Side Academy	E. Trudeau Thomas
Pittsburgh	The University School	Guy H. Baskerville
Pittsburgh	The Winchester-Thurston School	Mary A. G. Mitchell
Pottstown	The Hill School	James I. Wendell
Saltsburg	Kiskiminetas Springs School	John J. Daub
Susquehanna	Laurel Hill Academy	J. R. Ibolsh
Washington	Washington Seminary	Mrs. Ezra Kempton Maxfield
Wayne	Valley Forge Military Academy	Milton G. Baker
Westtown	Westtown School	James F. Walker
Wynnewood	The Agnes Irwin School	Bertha M. Laws
York	York Collegiate Institute-York County Academy	Lester F. Johnson

Rhode Island

City	Institution	Head
East Greenwich	East Greenwich Academy	Maurice E. Barrett
Newport	St. George's School	J. Vaughan Merrick
Portsmouth	Portsmouth Priory School	J. Hugh Diman
Providence	Lincoln School	Marion S. Cole
Providence	The Mary C. Wheeler School	Mabel Van Norman, Acting
Providence	Moses Brown School	L. Ralston Thomas

South Carolina

City	Institution	Head
Aiken	Fermata School	Opal Hall
Bamberg	Carlisle School	James F. Risher
Charleston	Ashley Hall	Mary V. McBee

Tennessee

City	Institution	Head
Baxter	Baxter Seminary	Harry L. Upperman
Bell Buckle	Webb School	W. R. Webb
Butler	Watauga Academy	C. A. Todd
Chattanooga	Baylor School	Herbert B. Barks
Chattanooga	Girls' Preparatory School	Tommie P. Duffy, Eida L. Jarnigan
Chattanooga	The McCallie School	S. J. & J. P. McCallie
Columbia	Columbia Military Academy	C. A. Ragsdale
Franklin	Battle Ground Academy	George I. Briggs
Memphis	Miss Hutchison's School	Mary G. Hutchison
Nashville	Peabody Demonstration School	J. E. Windrow
Petersburg	The Morgan School	R. Kenneth Morgan, Jr.
Pleasant Hill	Pleasant Hill Academy	Victor Obenhaus
Sewanee	Sewanee Military Academy	Wm. R. Smith
Sweetwater	Tennessee Military Institute	C. R. Endsley

Texas

City	Institution	Head
Bryan	Allen Academy	H. Brownlee
Dallas	Hockaday School	Ela Hockaday
Dallas	Terrill Preparatory School and Junior College	S. M. Davis
El Paso	Radford School for Girls	Lucinda deL. Templin
Houston	Kinkaid School	Mrs. W. J. Kinkaid
Houston	St. Thomas College High School	A. L. Higgins
Laredo	Holding Institute	Anton Deschner
San Antonio	The Ruth Coit School	Katharine Lee
San Antonio	Peacock Military Academy	Wesley Peacock, Jr.
San Antonio	Texas Military Institute	W. W. Bandurant
San Marcos	San Marcos Academy	R. M. Cavness

Utah

City	Institution	Head
Salt Lake City	Rowland Hall School for Girls	Fanny B. Jones, Acting

Vermont

City	Institution	Head
Lyndon Center	Lyndon Institute	O. D. Mathewson
Manchester	Burr & Burton Seminary	Ralph E. Howes
Putney	Putney School	Carmelita Hinton
St. Johnsbury	St. Johnsbury Academy	Stanley R. Oldham
Saxtons River	Vermont Academy	Laurence G. Leavitt

Virginia

City	Institution	Head
Alexandria	Episcopal High School	A. R. Hoxton
Alexandria	St. Agnes School, Inc.	Helen Arny Macan
Chatham	Chatham Hall	Edmund J. Lee
Chatham	Hargrave Military Academy	Aubrey H. Camden
Danville	Danville Military Institute	Thomas Wilborn
Fork Union	Fork Union Military Academy	J. J. Wicker
Fort Defiance	Augusta Military Academy	Thos. J. Roller
Front Royal	Randolph-Macon Academy	John C. Boggs
Greenway	The Madeira School	Lucy Madeira Wing
Lynchburg	Virginia Episcopal School	Oscar deW. Randolph
Middleburg	Foxcroft School	Charlotte H. Noland

City	Institution	Head
Richmond	The Collegiate School for Girls	Catharine M. Stauffer
Richmond	McGuire's University School	John P. McGuire
Richmond	St. Catherine's School	Mrs. Jeffrey R. Brackett
Richmond	St. Christopher's School	John Page William
Staunton	Staunton Military Academy	J. Worth Pence
Staunton	Stuart Hall	Ophelia S. T. Carr
Warrenton	Warrenton Country School	Léa M. Bouligny
Waynesboro	Fishburne Military School	M. H. Hudgins
Woodberry Forest	Woodberry Forest School	J. Carter Walker
Woodstock	Massanutten Academy	Howard J. Benchoff

Washington

City	Institution	Head
Seattle	Helen Bush School	Helen T. Bush
Seattle	Saint Nicholas School	Fanny C. Steele
Tacoma	Annie Wright Seminary	Elizabeth M. Fitch

West Virginia

City	Institution	Head
Lewisburg	Greenbrier Military School	J. M. Moore

Wisconsin

City	Institution	Head
Delafield	St. John's Military Academy	Roy F. Farrand
Kenosha	Kemper Hall	Mother Superior
Lake Geneva	Northwestern Military & Naval Academy	R. P. Davidson
Milwaukee	Milwaukee Country Day School	A. Gledden Santer
Milwaukee	Milwaukee-Downer Seminary	Marjorie French
Milwaukee	Milwaukee University School	Frank S. Spigener
Prairie du Chien	Campion School	T. J. Stemper

Canada

City	Institution	Head
Aurora, Ont.	St. Andrew's College	Kenneth Ketchum
Belleville, Ont.	Albert College	Bert Howard
Kitchener, Ont.	St. Jerome's College	Wm. G. Borho
Montreal, Que.	Lower Canada College	V. C. Wansbrough
Montreal, Que.	Mt. St. Louis College	Brother Anselme
Sackville, N. B.	Mt. Allison Academy and Commercial College	L. R. Glenn, Acting
St. Thomas, Ont.	Alma Junior College	P. S. Dobson
Stanstead, Que.	Stanstead Wesleyan College	E. C. Amaron
Toronto, Ont.	Bishop Strachan School	E. M. Lowe
Toronto, Ont.	Branksome Hall	Edith M. Read
Toronto, Ont.	Havergal College	G. E. Millard
Toronto, Ont.	Loretto Abbey	
Toronto, Ont.	St. Joseph's College School	Sister Maura
Winnipeg, Man.	St. John's College School	W. Burman
Wolfville, N. S.	Horton Academy	E. W. Robinson

Cuba

City	Institution	Head
Havana	Cathedral School	Bessie S. Casas

Hawaii

City	Institution	Head
Honolulu	Kamehameha Schools	Homer F. Barnes

Philippine Islands

City	Institution	Head
Baguio	Brent School	A. H. Richardson

SECTION XVI

SUPERINTENDENTS OF SCHOOLS IN PLACES OF 5000 POPULATION AND OVER

In the following list are included all places which are known to have a superintendent of schools and which, according to the 1930 Federal Census, have a population of 5,000 or over. These include incorporated cities, towns, boroughs and villages, unincorporated towns (in New England), and townships classified as urban by the Bureau of the Census. The names of the superintendents have been revised to December, 1940, and in some cases more recently.

References

(a) County superintendent. (b) Parish superintendent. (c) Supervising principal.

Alabama

City	*Superintendent*
Andalusia	C. L. Martin
Anniston	C. C. Moseley
Bessemer	J. Clyde Orr
Birmingham	C. B. Glenn
Decatur	S. E. Alverson
Dothan	Bruce Flurry
Eufaula	T. G. Wilkinson
Fairfield	B. B. Baker
Florence	J. W. Powell
Gadsden	C. A. Donehoo
Huntsville	W. G. Hamm
Jasper	G. T. Patrick
Lanett	Taylor H. Kirby
Mobile	W. C. Griggs (a)
Montgomery	C. M. Dannelly (a)
Opelika	R. B. Mardre
Phenix City	Lucien P. Stough
Selma	Walter M. Jackson
Sheffield	C. M. Brewster
Talladega	Frank L. Harwell
Tarrant	W. A. Parker
Troy	L. D. Bynum
Tuscaloosa	H. G. Dowling

Arizona

City	*Superintendent*
Bisbee	R. E. Souers
Clarksdale	G. B. Jones
Douglas	J. E. Carlson, Jr.
Flagstaff	John Q. Thomas
Globe	H. E. Stevenson
Jerome	J. O. Mullen
Miami	Ivan P. Hostetler
Morenci	Jos. H. Fairbanks
Nogales	A. J. Mitchell
Phoenix	John D. Loper (Elementary) E. W. Montgomery (High)
Prescott	Donald R. Sheldon
Tucson	C. E. Rose
Winslow	R. E. Booth
Yuma	C. W. McGraw (Elementary) Laurance T. Rouse (High)

Arkansas

City	*Superintendent*
Blytheville	W. D. McClurkin
Camden	F. W. Whiteside
Conway	B. A. Short
El Dorado	J. I. McClurkin
Fayetteville	Frank S. Root
Fort Smith	J. W. Ramsey
Helena	J. F. Wahl
Hope	Miss Beryl Henry
Hot Springs	Emmette E. Bratcher
Jonesboro	R. H. Moore
Little Rock	R. C. Hall
Malvern	J. L. Pratt
No. Little Rock	R. A. Cox
Paragould	Rufus D. Haynes
Pine Bluff	J. R. Allen
Russellville	W. E. Phipps
Texarkana	W. E. Gann
Van Buren	Virgle Coleman

California

City	*Superintendent*
Alameda	Wm. G. Paden
Albany	Allen Keim
Alhambra	Geo. E. Bettinger
Anaheim	M. A. Gauer (Elementary) J. A. Clayes (High)
Arcadia	Elmer E. Westerhouse (Elementary)
Bakersfield	John L. Compton (Elementary) T. L. Nelson (Secondary)
Berkeley	Virgil E. Dickson
Beverly Hills	Merton E. Hill
Brawley	Geo. K. Anderson (Elementary)
Burbank	B. F. Enyeart
Burlingame	L. D. Henderson (Elementary)
Calexico	J. W. Lawson
Chico	F. F. Martin
Colton	J. H. Waldron
Compton	Mrs. Ardella B. Tibbey (Elementary) O. S. Thompson (Secondary)
Corona	Frank E. Bishop
Coronado	J. Leslie Cutler
Culver City	Glenn A. Riddlebarger (Elementary)
Daly City	R. L. Crane, Jr. (Elementary) James Ferguson (High)
El Centro	Guy A. Weakley
Eureka	J. Warren Ayer
Fresno	Homer C. Wilson
Fullerton	R. E. Green (Elementary) Louis E. Plummer (Secondary)
Glendale	Willard S. Ford
Hanford	C. E. Denham (Elementary)
Hawthorne	Dan T. Williams (Elementary)
Hayward	Robert M. Reid (Elementary) H. B. Long (High)
Inglewood	Robert E. Cralle (Elementary) Harold O. Simar (High)
Lodi	Leroy Nichols
Long Beach	K. E. Oberholtzer
Los Angeles	Vierling Kersey
Lynwood	W. R. Fouts (Elementary)
Martinez	Forrest V. Routt
Marysville	W. A. Kynoch
Merced	W. M. Smith (Elementary) A. W. Meany (High)
Modesto	J. H. Bradley
Monrovia	Dwight M. Lydell (Elementary) A. K. Wilson (High)
Montebello	Mark R. Jacobs
Monterey	J. R. Croad (Elementary) J. R. McKillop (High)
Napa	Irene Snow (Elementary) H. M. MacPherson (High)
National City	Fred M. Tonge (Elementary) J. M. McDonald (High)
Oakland	William F. Ewing
Ontario	Bruce Miller (Elementary) Gardiner W. Spring (Secondary)
Orange	Don S. Danner (Elementary) A. Haven Smith (High)
Oxnard	C. A. Brittell
Pacific Grove	R. H. Down
Palo Alto	J. R. Overturf
Pasadena	J. A. Sexson
Petaluma	David M. Durst
Piedmont	Harry W. Jones
Pittsburg	F. S. Ramsdell
Pomona	Emmett Clark
Porterville	Emmet R. Berry (Elementary) B. H. Grisemer (Secondary)
Redlands	John Branigan
Redondo Beach	Harry P. McCandless (Elementary) Aileen S. Hammond (High)
Redwood City	Andrew Spinas (Elementary)
Richmond	W. T. Helms
Riverside	Ira C. Landis
Roseville	W. T. Eich (Elementary) J. W. Hanson (High)
Sacramento	C. C. Hughes
Salinas	R. D. Case
San Bernardino	Albert D. Graves
San Diego	Will C. Crawford
San Francisco	J. P. Nourse
San Gabriel	Rolland H. Upton (Elementary)
San Jose	W. L. Bachrodt
San Leandro	Andrew J. Cartwright (Elementary)
San Luis Obispo	Charles E. Teach
San Mateo	Leil L. Young (Elementary) Homer Martin (High)
San Rafael	O. R. Hartzell
Santa Ana	Frank A. Henderson
Santa Barbara	Curtis E. Warren
Santa Cruz	Homer H. Cornick

City	Superintendent
Santa Maria	Robert A. Bruce (Elementary) Andrew P. Hill, Jr. (Secondary)
Santa Monica	Percy R. Davis
Santa Paula	George A. Bond (Elementary) F. M. Eakin (High)
Santa Rosa	Jerome O. Cross
South Pasadena	Roy E. Simpson
South San Francisco	G. Carl Weller
Stockton	Ansel S. Williams
Tulare	W. B. Knokey
Vallejo	Elmer L. Cave
Ventura	Theodore Greider (Elementary) D. R. Henry (Secondary)
Visalia	DeWitt Montgomery
Watsonville	T. S. MacQuiddy
Whittier	Will E. Wiley (Elementary) D. A. Stouffer (High)
Woodland	Edward H. Farr

Colorado

City	Superintendent
Alamosa	G. P. Young
Boulder	G. Derwood Baker
Canon City	L. L. Beahm
Colorado Springs	Earl D. Cline
Denver	Charles E. Greene
Durango	Emory E. Smiley
Englewood	R. D. Jenkins
Fort Collins	Craig P. Minear
Grand Junction	J. Fred Essig
Greeley	Hubert D. Eldridge
La Junta	G. T. Wilson
Longmont	Kent L. Sanborn
Loveland	R. W. Truscott
Pueblo	District No. 1, J. H. Risley District No. 20, Ray E. Redmond
Salida	L. D. Hightower
Sterling	R. R. Knowles
Trinidad	William R. Ross
Walsenburg	S. M. Andrews

Connecticut

City	Superintendent
Ansonia	John J. Stevens
Branford	R. E. Pinkham
Bridgeport	Worcester Warren
Bristol	Karl A. Reiche
Danbury	Harold F. Dow
Darien	Edward H. Fuller
Derby	Richard T. Tobin
E. Hartford	P. S. Barnes
E. Haven	W. E. Gillis
Enfield	E. H. Parkman
Fairfield	H. M. Jeffords
Glastonbury	Francis S. Knox
Greenwich	Maynard W. Linn
Griswold	Ernest G. Lake
Groton	S. B. Butler
Hamden	Margaret L. Keefe
Hartford	Fred D. Wish, Jr.
Killingly	Noyes C. Stickney
Manchester	Arthur H. Illing
Meriden	R. N. Brown
Middletown	Fred W. Shearer
Middletown (twp.)	Van Buren Moody
Milford	C. W. Maddocks
Naugatuck	H. E. Chittenden
New Britain	C. C. Ring
New Canaan	E. F. Waldron
New Haven	J. A. Fitzgerald
New London	Warren A. Hanson
Norwalk	Philip A. Jakob
Norwich	James E. Murphy
Plainfield	J. L. Chapman
Plainville	Harold W. Thomas
Plymouth	H. S. Fisher
Putnam	Thomas W. Mahan
Rockville	Philip M. Howe
Seymour	H. L. Adams
Shelton	Harry E. Fowler
Southington	William M. Strong
Stafford	Earl M. Witt
Stamford	Leon C. Staples
Stonington	P. W. Lane
Stratford	Virgil H. Barker
Torrington	G. J. Vogel
Vernon	P. M. Howe
Wallingford	Charles E. Elkema
Waterbury	Thomas J. Condon
Watertown	G. C. Swift
West Hartford	Lloyd H. Bugbee
West Haven	Seth G. Haley
Westport	Heath E. White
Wethersfield	Wilson Greer
Willimantic	Egbert A. Case
Windsor	Earle S. Russell
Winsted	L. R. McKusick

Delaware

City	Superintendent
Dover	E. Hall Downes
Wilmington	S. M. Stouffer

District of Columbia

City	Superintendent
Washington	Frank W. Ballou

Florida

City	Superintendent
Bartow	Frank E. Brigham
Bradenton	Jessie P. Miller (a)
Clearwater	G. V. Fuguitt (a)
Coral Gables (Address Miami)	J. T. Wilson (a)
Daytona Beach (Address Deland)	G. W. Marks (a)
Deland	G. W. Marks
Fort Lauderdale	Ulric J. Bennett (a)
Fort Myers	Harry F. Hendry (a)
Gainesville	Howard W. Bishop (a)
Jacksonville	W. Daniel Boyd (a)
Key West	M. E. Russell (a)
Lakeland (Address Bartow)	Frank E. Brigham (a)
Lake Worth (Address W. Palm Beach)	John I. Leonard (a)
Miami	J. T. Wilson (a)
Miami Beach (Address Miami)	J. T. Wilson (a)
Ocala	Broward Lovell (a)
Orlando	Judson B. Walker (a)
Palatka	L. S. Barstow (a)
Panama City	M. M. Mashburn (a)
Pensacola	A. S. Edwards (a)
Plant City (Address Tampa)	E. L. Robinson (a)
River Junction (Address Quincy)	C. H. Gray (a)
St. Augustine	D. D. Corbett (a)
St. Petersburg (Address Clear-water)	G. V. Fuguitt (a)
Sanford	T. W. Lawton (a)
Sarasota	T. W. Yarbrough (a)
Tallahassee	F. A. Rhodes (a)
Tampa	E. L. Robinson (a)
West Palm Beach	John I. Leonard (a)
Winter Haven (Address Bartow)	Frank E. Brigham (a)

Georgia

City	Superintendent
Albany	J. O. Allen
Americus	S. C. Haddock
Athens	B. M. Grier
Atlanta	W. A. Sutton
Augusta	S. D. Copeland (a)
Bainbridge	E. G. Elcan
Brunswick	G. W. Wannamaker (a)
Carrollton	M. C. Wiley
Cartersville	W. H. Brandon
Cedartown	J. E. Purks
Columbus	Paul M. Munro
Cordele	D. H. Standard
Dalton	W. W. Stancil
Decatur	Lamar Ferguson
Dublin	A. J. Hargrove
East Point	Jere Wells (a)
Fitzgerald	Fred Ayers
Gainesville	C. J. Cheves
Griffin	S. N. Gardner
La Grange	B. A. Lancaster
Macon	W. P. Jones (a)
Marietta	C. A. Keith
Milledgeville	P. N. Bivins (a)
Moultrie	J. L. Yaden
Newnan	C. B. Mathews
Rome	B. F. Quigg
Savannah	Ormond B. Strong (a)
Thomasville	N. M. Huckabee, H. R. Mahler, Asso. Supts.
Valdosta	A. G. Cleveland
Waycross	Ralph Newton

Idaho

City	Superintendent
Boise	Zed L. Foy
Coeur d'Alene	G. O. Phippeny
Idaho Falls	W. W. Christensen
Lewiston	Glenn W. Todd
Nampa	J. E. Walsh
Pocatello	E. Norman Vaughn
Twin Falls	Homer M. Davis

Illinois

City	Superintendent
Alton	W. R. Curtis
Argo-Summit	Clarence Barrett
Aurora	K. D. Waldo (East Side) C. E. Larson (West Side)
Batavia	John B. Nelson
Beardstown	W. L. Gard
Belleville	H. V. Calhoun
Belvidere	R. E. Garrett
Benton	Charles M. Johnson
Berwyn	Ivan C. Nicholas (Dist. No. 98) E. W. Martin (Dist. No. 100)
Bloomington	Paul Gossard
Blue Island	H. A. Perrin
Brookfield	Leon Smaage
Cairo	Leo C. Schultz
Calumet City	Eric E. Brown J. F. Donisage (Dist. No. 156)
Canton	Ben Kietzman
Carbondale	Raymond Hoffner
Centralia	R. V. Jordan
Champaign	V. L. Nickell
Charleston	U. B. Jeffries
Chicago	Wm. H. Johnson
Chicago Heights	Ben A. Sylla
Cicero	G. A. Schwebel
Clinton	J. D. McKibben
Collinsville	E. B. Burroughs
Danville	C. E. Vance
Decatur	William Harris
De Kalb	F. W. Phillips
Des Plaines	E. R. Selleck
Dixon	A. H. Lancaster
Downers Grove	George E. De Wolf
Dundee	V. A. Sutfin
Du Quoin	Oren D. McClure
East Moline	Harold M. Sohrbeck
East Peoria	Paul L. Bolin
East St. Louis	D. Walter Potts
Edwardsville	E. L. Alexander
Elgin	O. F. Patterson
Elmhurst	V. L. Beggs
Elmwood Park	George N. Wells
Evanston	J. R. Skiles (Dist. No. 75) David E. Walker (Dist. No. 76)
Forest Park	W. S. Dimmett
Freeport	B. F. Shafer
Galesburg	Richard V. Lindsey
Gillespie	J. W. White
Glencoe	Paul J. Misner
Glen Ellyn	S. A. Denison
Granite City	A. M. Wilson
Harrisburg	Russell Malan
Harvey	C. C. Thompson
Herrin	John R. Creek
Highland Park	R. H. Price (Dist. No. 107) Clark G. Wright (Dist. No. 108)
Hinsdale	Martin B. Travis
Hoopeston	W. R. Lowery
Jacksonville	R. O. Stoops
Johnston City	Earl E. Miller
Joliet	G. N. Hufford
Kankakee	Irving Munson
Kewanee	Charles A. Bruner

City	Superintendent
La Grange	J. E. Pease (Elementary)
Lake Forest	Melvin G. Davis
La Salle	E. G. Miller
Lawrenceville	M. N. Todd
Lincoln	D. F. Nickols
Litchfield	Oscar M. Chute
Lombard	C. E. Swingley
Macomb	C. S. Chappelear
Madison	E. W. Heob
Marion	H. O. Belford
Mattoon	H. B. Black
Maywood	Clarence H. Pygman,
Melrose Park	Robert E. Murphy
Metropolis	C. J. Ramsay
Moline	E. P. Nutting
Monmouth	Roy Fetherston
Morris	L. E. Starke
Mount Carmel	R. S. Condrey
Mount Vernon	J. Lester Buford
Murphysboro	Wm. H. Carruthers
Naperville	R. E. Beebe
Niles Center	R. E. Cotanche (High) O. O. Young (Elementary)
Normal	Monroe Melton
North Chicago	F. E. De Yoe (Dist. No. 63) R. L. Newenham (Dist. No. 64)
Oak Park	W. J. Hamilton
Olney	C. T. Cramer
Ottawa	C. J. Byrne
Pana	T. Hamilton Hale
Paris	John R. Moss
Park Ridge	Harry D. Winslow
Pekin	C. B. Smith
Peoria	E. C. Fisher
Peru	C. W. Martin
Pontiac	A. F. Speltz
Quincy	R. O. Evans
River Forest	V. M. Rogers
Riverside	L. J. Hauser
Rockford	Selmer H. Berg
Rock Island	Earl H. Hanson
St. Charles	G. E. Thompson
Savanna	Harold Mackenzie
Springfield	R. E. Fildes
Spring Valley	James Nesti
Sterling	O. A. Fackler (Dist. No. 11) H. U. Challand (Dist. No. 10)
Streator	H. K. Whittier
Summit	O. B. Barrett
Taylorville	Warren P. Shepherd
Urbana	T. H. Cobb
Venice	J. H. Gore
Villa Park	H. E. Hinkel
Waukegan	John S. Clark
West Frankfort	C. A. Waller
Wheaton	K. K. Tibbetts
Wilmette	J. R. Harper
Winnetka	C. W. Washburne
Wood River	G. A. Smith
Woodstock	W. J. Colahan
Zion	Rolland H. Lundahl

Indiana

City	Superintendent
Anderson	Arthur Campbell
Auburn	H. L. McKenney
Bedford	H. H. Mourer
Bicknell	Harold Axe
Bloomington	H. E. Binford
Bluffton	L. R. Willey
Brazil	C. P. Keller
Clinton	E. C. Boyd
Columbus	Donald DuShane
Connersville	E. O. Dodson
Crawfordsville	M. C. Darnall
Decatur	Walter J. Krick
East Chicago	Roy W. Feik
Elkhart	Harold H. Church
Elwood	William F. Smith
Evansville	Ralph Irons
Fort Wayne	Merle Abbett
Frankfort	Waldo Wood
Franklin	R. W. Sheek
Gary	H. S. Jones
Goshen	Ort L. Walter
Greensburg	Carl Billings
Hammond	L. L. Caldwell
Hartford City	Joseph C. Wagner
Hobart	Harlie Garver
Huntington	C. E. Byers
Indianapolis	DeWitt S. Morgan
Jeffersonville	W. F. Vogel
Kendallville	H. M. Dixon
Kokomo	C. V. Haworth
Lafayette	Morris E. McCarty
La Porte	Wendell R. Godwin
Lebanon	Paul Van Riper
Linton	T. J. Beecher
Logansport	Reed Groninger
Madison	E. O. Muncie
Marion	Elbert E. Day
Michigan City	M. L. Knapp
Mishawaka	P. C. Emmons
Mount Vernon	Stoy Hedges
Muncie	H. B. Allman
New Albany	C. B. McLinn
New Castle	R. H. Valentine
Peru	J. P. Crodian
Plymouth	Ray Kuhn
Portland	D. S. Weller
Princeton	G. E. Derbyshire
Richmond	W. G. Bate
Rushville	L. A. Lockwood
Seymour	N. J. Lasher
Shelbyville	W. F. Loper
South Bend	Frank E. Allen
Sullivan	Dale C. Billman
Terre Haute	George C. Carroll
Valparaiso	Roy B. Julian
Vincennes	V. L. Eikenberry
Wabash	O. J. Neighbours
Warsaw	James M. Leffel
Washington	Clyde Parker
West Lafayette	F. A. Burtsfield
Whiting	W. W. Borden

Iowa

City	Superintendent
Albia	W. W. Hartzell
Ames	Leonard A. Steger
Atlantic	W. H. Tate
Boone	H. J. Van Ness
Burlington	R. H. Bracewell
Carroll	V. E. Stansbury
Cedar Falls	J. H. Peet
Cedar Rapids	Arthur C. Deamer
Centerville	E. W. Fannon
Chariton	J. R. Cougill
Charles City	P. C. Lapham
Cherokee	J. C. Hoglan
Clarinda	Fred W. Johansen
Clinton	M. M. Schell
Council Bluffs	C. L. Crawford
Creston	Burton R. Jones
Davenport	Irvin H. Schmitt
Des Moines	A. W. Merrill
Dubuque	Jordan L. Larson
Estherville	N. E. Demoney
Fairfield	W. G. Pence
Fort Dodge	Harold J. Williams
Fort Madison	A. I. Tiss
Iowa City	I. A. Opstad
Keokuk	J. C. Wright
Knoxville	M. A. Trabert
Le Mars	Harvey N. Kluckholm
Marshalltown	W. F. Shirley
Mason City	R. B. Irons
Muscatine	A. A. Johnson
Newton	B. C. Berg
Oelwein	R. D. Noble
Oskaloosa	R. J. Carroll
Ottumwa	Frank W. Douma
Perry	J. S. Vanderlinden
Red Oak	J. R. Inman
Shenandoah	W. Dean McKee
Sioux City	L. W. Feik
Spencer	W. F. Johnson
Storm Lake	A. Everett Ruby
Washington	E. A. Ralston
Waterloo	J. M. Logan (East Side) Charles A. Kittrell (West Side)
Webster City	Burrus E. Beard

Kansas

City	Superintendent
Abilene	W. C. Robinson
Arkansas City	C. E. St. John
Atchison	W. D. Wolfe
Chanute	L. H. Petit
Coffeyville	K. W. McFarland
Concordia	E. B. Allbaugh
Dodge City	A. G. Schroedermeier
El Dorado	J. F. Hughes
Emporia	W. M. Richards
Fort Scott	V. M. Liston
Garden City	J. R. Jones
Great Bend	H. C. Scarborough
Hutchinson	J. W. Gowans
Independence	J. H. Clement
Iola	John A. Fleming
Junction City	Donald A. McConnell
Kansas City	F. L. Schlagle
Lawrence	Clifford D. Dean
Leavenworth	I. J. Bright
Liberal	N. B. Mahuron
Manhattan	W. E. Sheffer
McPherson	R. W. Potwin
Newton	J. B. Heffelfinger
Ottawa	G. H. Marshall
Parsons	R. H. Hughes
Pittsburg	M. M. Rose
Pratt	Amos W. Glad
Salina	Chas. E. Hawkes
Topeka	A. J. Stout
Wellington	Claude Kissick
Wichita	L. W. Mayberry
Winfield	Evan E. Evans

Kentucky

City	Superintendent
Ashland	Arville Wheeler
Bellevue	W. H. Marshall
Bowling Green	L. C. Curry
Catlettsburg	Carl Hicks
Corbin	G. W. Campbell
Covington	G. O. Swing
Danville	E. F. Birckhead
Dayton	Olin W. Davis
Fort Thomas	D. W. Bridges
Frankfort	C. D. Redding
Glasgow	J. W. Depp
Hazard	R. T. Whittinghill
Henderson	C. E. Dudley
Hopkinsville	Gladstone Koffman
Jenkins	C. V. Snapp
Lexington	Ben Herr, Acting
Louisville	Zenos E. Scott
Ludlow	J. S. Brown
Madisonville	Harper Gatton
Mayfield	Charles I. Henry
Maysville	John Shaw
Middlesboro	J. W. Bradner
Newport	A. D. Owens
Owensboro	J. L. Foust
Paducah	H. L. Smith
Paris	Lee Kirkpatrick
Richmond	W. F. O'Donnell
Somerset	P. H. Hopkins
Winchester	B. B. Hodgkin

Louisiana

City	Superintendent
Alexandria	H. M. Wells (b)
Bastrop	E. D. Shaw (b)
Baton Rouge	C. B. Turner (b)
Bogalusa	M. J. Israel
Crowley	A. T. Browne (b)
Gretna	L. W. Higgins (b)
Hammond (Address Amite)	R. W. Russell (b)
Houma	H. L. Bourgeois (b)
Lafayette	J. W. Faulk (b)
Lake Charles	Ward Anderson
Minden	J. E. Pitcher (b)
Monroe	E. L. Neville
Morgan City	R. L. Robinson (b)
New Iberia	L. G. Porter (b)
New Orleans	Nicholas Bauer (b)
Opelousas	W. B. Prescott (b)
Plaquemine	L. P. Terrebonne (b)
Shreveport	E. W. Jones (b)
West Monroe	T. O. Brown (b)

Maine

City	Superintendent
Auburn	G. R. Gardner
Augusta	F. W. Burrill

City	Superintendent
Bangor	Arthur E. Pierce
Bath	John Parker
Belfast	Horatio S. Read
Biddeford	A. A. Garcelon, Jr.
Brewer	H. R. Houston
Brunswick	Leon P. Spinney
Calais	Alden W. Allen
Caribou	G. M. Carter
Fairfield	W. H. Phinney
Fort Fairfield	William H. Jenkins
Gardiner	A. Raymond Carter
Houlton	Phillip H. Woodworth
Lewiston	A. A. Woodworth
Millinocket	Earle F. Wingate
Old Town	Joseph A. Leonard
Portland	W. B. Jack
Presque Isle	R. J. Carpenter
Rockland	George J. Cumming
Rumford	L. E. Williams
Saco	Harry C. Hull
Sanford	J. A. Hamlin
Skowhegan	Raymond S. Finley
South Portland	George E. Beal
Waterville	C. E. Glover
Westbrook	Guy V. Sinclair

Maryland

City	Superintendent
Annapolis	George Fox (a)
Baltimore	D. E. Weglein
Cambridge	W. Theodore Boston (a)
Cumberland	Charles L. Kopp (a)
Frederick	E. W. Pruitt (a)
Frostburg (Address Cumberland)	C. L. Kopp (a)
Hagerstown	Benjamin C. Willis (a)
Salisbury	J. M. Bennett (a)
Tacoma Park (Address Rockville)	Edwin W. Broome (a)

Massachusetts

City	Superintendent
Abington (Address North Abington)	Derwood A. Newman
Adams	J. F. Farrell
Agawam	B. J. Phelps
Amesbury	Fred C. English
Amherst	L. L. Dudley
Andover	Kenneth L. Sherman
Arlington	Joseph S. Keating
Athol	William A. Spooner
Attleboro	L. A. Fales
Auburn	C. M. Harris
Barnstable	Melvin C. Knight
Belmont	Willard B. Spalding
Beverly	Starr M. King
Billerica	E. C. Vining
Boston	Arthur L. Gould
Braintree	C. E. Fisher
Bridgewater	Albert F. Hunt, Jr.
Brockton	John L. Miller
Brookline	E. R. Caverly
Cambridge	M. E. Fitzgerald
Canton	Richard N. Anketell
Chelmsford	G. S. Wright
Chelsea	Leo P. Casey
Chicopee	J. J. Desmond, Jr.
Clinton	T. F. Gibbons
Concord	H. Paul Larrabee
Danvers	I. G. Smith
Dartmouth (Address South Dartmouth)	Richard D. Tucker
Dedham	J. C. Anthony
Dracut	James C. Riley
Easthampton	Charles A. Mitchell
Easton	G. C. Mann
Everett	F. A. Ashley
Fairhaven	F. M. Gifford
Fall River	H. L. Belisle
Falmouth	Paul Dillingham
Fitchburg	George C. Francis
Foxboro	Chase MacArthur
Framingham	Burr J. Merriam
Franklin	A. W. Hale
Gardner	F. T. Reynolds
Gloucester	E. W. Fellows
Grafton	Robert W. Barclay
Great Barrington	Kenneth Frank Preston
Greenfield	F. W. Porter
Haverhill	A. I. Clow
Hingham	O. K. Collins
Holyoke	W. R. Peck
Hudson	E. J. Harriman
Ipswich	Harry S. Merson
Lawrence	Dennis E. Callahan
Leominster	Wm. B. Appleton
Lexington	T. S. Grindle
Lowell	V. M. McCartin
Ludlow	P. R. Baird
Lynn	H. S. Gruver
Malden	F. G. Marshall
Mansfield	Bert L. Merrill
Marblehead	James W. Vose
Marlboro	E. P. Carr
Maynard	Donald A. Lent
Medford	J. S. Kadesch
Melrose	H. H. Stuart
Methuen	L. H. Conant
Middleboro	J. S. Cushing
Milford	A. O. Caswell
Millbury	William D. Shea
Milton	H. F. Turner
Montague	Arthur E. Burke
Natick	C. R. Hall
Needham	Harry A. Brown
New Bedford	A. P. Keith
Newburyport	Frank Sweeney
Newton	Julius E. Warren
North Adams	Justin W. Barrett
Northampton	William R. Barry
North Andover	F. E. Pitkin
North Attleboro	G. W. Morris
Northbridge (Address Whitinsville)	H. J. Phipps
Norwood	Lincoln D. Lynch
Orange	Edward C. Hempel
Palmer	C. H. Hobson
Peabody	Wm. A. Welch
Pittsfield	Edward J. Russell
Plymouth	A. B. Handy
Quincy	J. N. Muir
Randolph	A. O. Christiansen
Reading	E. C. Grover
Revere	C. F. Lindstol
Rockland	R. S. Esten
Salem	G. M. Bemis
Saugus	Vernon W. Evans
Shrewsbury	M. A. Sturtevant
Somerset	H. F. Bates
Somerville	E. W. Ireland
Southbridge	Channing H. Greene
South Hadley	Albert T. Patty
Spencer	I. H. Agard
Springfield	John E. Granrud
Stoneham	C. E. Varney
Stoughton	Warren B. Lyman
Swampscott	Frank L. Mansur
Taunton	W. A. Mowry
Tewksbury (Address Wilmington)	S. G. Bean
Uxbridge	A. B. Garcelon
Wakefield	W. B. Atwell
Walpole	A. C. Jones
Waltham	W. H. Slayton
Ware	M. Leroy Greenfield
Wareham	Parker N. Moulton
Watertown	Francis A. Kelly
Webster	J. A. Lobban
Wellesley	Edwin H. Miner
Westboro	J. H. Armstrong
Westfield	C. D. Stiles
West Springfield	Franklin P. Hawkes
Weymouth	Charles R. Thibadeau
Whitman	F. E. Holt
Winchendon	Donovan S. Jones
Winchester	J. J. Quinn
Winthrop	Arthur E. Boudreau
Woburn	Daniel P. Hurld
Worcester	W. S. Young

Michigan

City	Superintendent
Adrian	George H. Little
Albion	George Walkotten
Alma	F. R. Phillips
Alpena	Russell H. Wilson
Ann Arbor	O. W. Haisley
Battle Creek	Eldon C. Geyer
Bay City	Benj. Klager
Benton Harbor	S. C. Mitchell
Berkley	M. P. Anderson
Birmingham	Howard D. Crull
Cadillac	B. C. Shankland
Charlotte	Jay Dykhouse
Coldwater	Robert E. Sharer
Dearborn	Ray H. Adams
Detroit	Frank Cody
Dowagiac	James A. Lewis
East Detroit	John N. Kantner
Ecorse	Arthur G. Erickson
Escanaba	John A. Lemmer
Ferndale	E. F. Down
Flint	L. H. Lamb
Fordson (Address Dearborn)	Harvey H. Lourey
Gladstone	A. R. Watson
Grand Haven	E. H. Babcock
Grand Rapids	A. W. Krause
Grosse Pointe	E. R. Van Kleeck
Hamtramck	M. A. Kopka
Hancock	O. M. Vedder
Hastings	D. A. Van Buskirk
Highland Park	W. H. Lemmel
Hillsdale	B. L. Davis
Holland	E. E. Fell
Ionia	A. A. Rather
Iron Mountain	John Jelsch
Ironwood	Arthur E. Erickson
Ishpeming	C. L. Phelps
Jackson	Harold Steele
Kalamazoo	Loy Norrix
Kingsford (Address Iron Mountain)	Frank C. Sweeney
Lansing	J. W. Sexton
Lapeer	E. E. Irwin
Lincoln Park	Leo W. Huff
Ludington	H. H. Hawley
Manistee	Dorr L. Wilde
Manistique	A. F. Hall
Marquette	W. M. Whitman
Marshall	H. W. Holmes
Menominee	J. L. Silvernale
Midland	J. J. Schafer
Monroe	George T. Cantrick
Mount Clemens	L. W. Fast
Mount Pleasant	Chas. B. Park
Muskegon	John A. Craig
Muskegon Heights	W. R. Booker
Negaunee	H. S. Doolittle
Niles	F. W. Crawford
Owosso	E. J. Willman
Petoskey	H. C. Spitler
Pontiac	Robert B. French
Port Huron	L. A. Packard
River Rouge	A. McDonald
Roseville	Glenn Schoenhals
Royal Oak	N. J. Quickstad
Saginaw	C. F. Miller
St. Clair Shores	Murl Momany
St. Joseph	E. B. Holden
Sault Ste. Marie	Foss Elwyn
Sturgis	Paul M. Winger
Three Rivers	Walter Horst
Traverse City	Glenn E. Loomis
Wyandotte	F. W. Frostic
Ypsilanti	E. H. Chapelle

Minnesota

City	Superintendent
Albert Lea	H. R. Peterson
Anoka	L. W. Adams
Austin	S. T. Neveln
Bemidji	I. W. Smith
Brainerd	G. B. Ferrell
Chisholm	J. P. Vaughan
Cloquet	E. B. Anderson
Columbia Heights	H. C. Nelson
Crookston	L. M. Wikre
Duluth	H. H. Eelkema
Ely	Stanley Adkins
Eveleth	A. D. Gillett
Fairmont	John J. Skinner
Faribault	C. Willard Cross
Fergus Falls	L. H. Dominick

City	Superintendent
Hastings	Roy E. Miller
Hibbing	Sydney A. Patchin
International Falls	J. A. Sathrum
Little Falls	James K. Michie
Mankato	J. E. Anderson
Minneapolis	C. R. Reed
Montevideo	C. A. Pederson
Moorhead	S. G. Reinertsen
New Ulm	W. A. Andrews
Owatonna	Irvin E. Rosa
Red Wing	G. V. Kinney
Robbinsdale	Edwin J. Cooper
Rochester	G. H. Sanberg
St. Cloud	H. B. Gough
St. Louis Park	N. H. McKay
St. Paul	Paul S. Amidon
St. Peter	Melville R. Davis
South St. Paul	Irvin T. Simley
Stillwater	Guy D. Smith
Thief River Falls	Morris Bye
Virginia	L. A. Lavine
West St. Paul	H. L. Garlough
Willmar	A. M. Wisness
Winona	Harold C. Bauer
Worthington	E. A. Durbahn

Mississippi

City	Superintendent
Biloxi	G. W. Ditto
Brookhaven	Edgar S. Bowlus
Clarksdale	H. B. Heidelberg
Columbus	C. N. Brandon
Corinth	Hal Anderson
Greenville	F. W. Murphy
Greenwood	W. C. Williams
Gulfport	B. Frank Brown
Hattiesburg	S. H. Blair
Jackson	K. P. Walker
Laurel	R. H. Watkins
McComb	D. L. Blackwelder
Meridian	H. M. Ivy
Natchez	W. H. Braden
Tupelo	T. M. Milam
Vicksburg	R. E. Selby (a)
Yazoo City	R. J. Koonce

Missouri

City	Superintendent
Boonville	L. E. Ziegler
Brookfield	L. V. Crookshank
Cape Girardeau	L. J. Schultz
Carthage	J. L. Campbell
Chillicothe	H. R. McCall
Clayton	John L. Bracken
Clinton	Arthur Lee
Columbia	W. E. Rosenstengel
De Soto	O. T. Coil
Flat River	Wesley A. Deneke
Fulton	Tom Conrad
Hannibal	E. T. Miller
Independence	W. E. Matthews
Jefferson City	Wade C. Fowler
Joplin	E. A. Elliott
Kansas City	Herold C. Hunt
Kirksville	J. H. Neville
Kirkwood	F. P. Tillman
Maplewood	G. E. Dille
Marshall	Willard J. Graff
Maryville	H. S. Thomas
Mexico	L. B. Hawthorne
Moberly	M. F. Beach
Nevada	Jerry J. Vineyard
Poplar Bluff	G. R. Loughead
St. Charles	Stephen Blackhurst
St. Joseph	T. E. Dale
St. Louis	Homer W. Anderson
Sedalia	Heber U. Hunt
Sikeston	R. A. Harper
Springfield	Harry P. Study
Trenton	S. M. Rissler
University City	Charles Banks
Warrensburg	Edward Beatty
Washington	C. J. Burger
Webb City	D. R. McDonald
Webster Groves	W. E. Goslin
Wellston	Millard M. Halter

Montana

City	Superintendent
Anaconda	W. K. Dwyer
Billings	M. C. Gallagher
Bozeman	D. S. Williams
Butte	Lowell W. Johnson
Great Falls	Irving W. Smith
Havre	John Shively
Helena	Payne Templeton
Kalispell	W. D. Swetland
Lewistown	C. G. Manning
Livingston	B. A. Winans
Miles City	W. E. Stegner
Missoula	Ira B. Fee

Nebraska

City	Superintendent
Alliance	H. R. Partridge
Beatrice	E. L. Novotny
Columbus	R. R. McGee
Fairbury	W. E. Scott
Falls City	A. B. Gelwick
Fremont	John G. Hansen
Grand Island	C. Ray Gates
Hastings	A. H. Staley
Kearney	Harry A. Burke
Lincoln	M. C. Lefler
McCook	F. L. Holmes
Nebraska City	Marion R. Shrader
Norfolk	A. P. Burkhardt
North Platte	W. J. Braham
Omaha	H. M. Corning
Scottsbluff	J. E. Shedd
York	Earle W. Wiltse

Nevada

City	Superintendent
Las Vegas	Maude Frazier
Reno	E. Otis Vaughn
Sparks	Procter Hug

New Hampshire

City	Superintendent
Berlin	Caleb H. Niles
Claremont	A. B. Kellogg
Concord	Natt B. Burbank
Derry	Edward I. Erickson
Dover	Gordon L. Fox
Franklin	Fred S. Libbey
Keene	Laurence O. Thompson
Laconia	Clark W. McDermith
Lebanon	W. J. English
Manchester	Austin J. Gibbons
Nashua	Earle T. Tracey
Portsmouth	Harry L. Moore
Rochester	Arthur S. Rollins
Somersworth	H. L. Winslow

New Jersey

City	Superintendent
Asbury Park	Maurice Lea Coleman
Atlantic City	Arthur S. Chenoweth
Audubon	William L. Fidler (c)
Bayonne	Preston H. Smith
Belleville	Wayne R. Parmer (c)
Bergenfield	Roy W. Brown (c)
Bloomfield	Edgar S. Stover
Bogota	Grant W. Leman (c)
Boonton	M. Burr Mann
Bound Brook	Albert S. Davis (c)
Bridgeton	Leigh M. Lott
Burlington	Vann H. Smith (c)
Caldwell	Paul H. Axtell (c)
Camden	Leon N. Neulen
Carlstadt	Edward F. Krom (c)
Carteret	
Cliffside Park	George F. Hall (c)
Clifton	George J. Smith
Collingswood	Carl M. Diefenbach (c)
Cranford	Howard R. Best (c)
Dover	R. S. Bowlby (c)
Dumont	Charles A. Selzer (c)
Dunellen	Ralph W. Crane (c)
East Orange	Henry E. Kentopp
East Rutherford	Alfred S. Faust (c)
Elizabeth	Ray E. Cheney
Englewood	Winton J. White
Fairlawn	F. H. Brunswick (c)
Fairview	Z. G. Masten, Jr. (c)
Fort Lee	J. B. Thompson (c)
Freehold	Lloyd S. Cassel (c)
Garfield	Joseph F. Moriarty
Glen Ridge	H. W. Dutch (c)
Gloucester City	Marvin E. Porch
Guttenburg	Mrs. Anna L. Klein (c)
Hackensack	George A. Merrill
Haddonfield	Everett C. Preston (c)
Haddon Heights	William C. Davis (c)
Hammonton	H. H. Smith (c)
Harrison	John P. Murray (c)
Hasbrouck Heights	C. C. Hitchcock (c)
Hawthorne	Stephen W. Moshier (c)
Highland Park	F. W. Furth (c)
Hillside	A. G. Woodfield (c)
Hoboken	Daniel S. Kealey
Irvington	Herschel S. Libby
Jersey City	James A. Nugent
Kearny	Edmund L. Tink
Lakewood	Carl M. Bair (c)
Leonia	Nelson C. Smith (c)
Linden	Paul R. Brown
Lodi	Henry V. Matthews (c)
Long Branch	William M. Smith
Lyndhurst	H. P. Shepherd (c)
Madison	Robert C. B. Parker (c)
Manville	John W. Zorella (c)
Metuchen	Elmo E. Spoerl (High) Carl A. Roos (Elementary)
Millburn twp.	John R. Patterson (c)
Millville	G. Edward McComsey
Montclair	A. L. Threlkeld
Moorestown	George C. Baker (c)
Morristown	J. Burton Wiley (c)
Neptune twp. (Address Ocean Grove)	O. J. Moulton (c)
Newark	Stanley H. Rolfe
New Brunswick	Frederick J. Sickles
Newton	C. H. Reagle (c)
North Arlington	W. R. Holbert (c)
North Bergen	R. W. Madden
North Plainfield	Beekman R. Terhune (c)
Nutley	John A. Spargo
Ocean City	George E. Brown
Orange	Howard J. McNaughton
Palisades Park	John W. Fuchs (c)
Passaic	Arthur D. Arnold
Paterson	John R. Wilson
Paulsboro	Paul R. Carl (c)
Penns Grove	A. J. Dohner (c)
Pensauken twp. (Address Merchantville)	George B. Fine (c)
Perth Amboy	W. C. McGinnis
Phillipsburg	Clarence V. Sloan
Pitman	Daniel W. Davis (c)
Plainfield	F. W. Cook
Pleasantville	Simon M. Horstick
Princeton	B. Woodhull Davis (c)
Prospect Park (Address Hawthorne)	Edmund H. Viemeister (c)
Rahway	Arthur L. Perry
Raritan twp. (Address Perth Amboy, R. #1)	Fred A. Talbot
Red Bank	Edwin C. Gilland (c)
Ridgefield Park	A. Ray Palmer (c)
Ridgewood	I. B. Somerville (c)
Roselle	Joseph L. Bustard (c)
Roselle Park	E. F. Smith (c)
Rutherford	Guy L. Hilleboe (c)
Salem	Halliday R. Jackson
Sayreville	Jesse Selner (c)
Secaucus	M. J. Pechtel (c)
Somerville	T. Latimer Brooks (c)
South Amboy	James F. Tustin
South Orange	John H. Bosshart (c)
South Plainfield	Harry C. Fries (c)
South River	Lester A. Rodes (c)
Summit	
Teaneck	Lester N. Neulen (c)
Tenafly	George A. Kipp (c)
Trenton	Paul Loser
Union City	Albert C. Parker
Union twp.	Charles T. Hassard
Ventnor	Mary V. Peters (Elementary)
Verona	C. Vincent Geiger (c)
Vineland	Lawrence R. Winchell (c)
Wallington	Thomas L. Harty (c)
Weehawken	Kenneth F. Woodbury (c)
Westfield	C. A. Philhower (c)
West New York	Harry L. Bain
West Orange	S. C. Strong (c)

City	Superintendent
Wildwood	Lanning A. Myers
Woodbridge	V. C. Nicklas (c)
Woodbury	Harry L. Stearns
Wood Ridge	Fremont D. Donley (c)

New Mexico

City	Superintendent
Albuquerque	John Milne
Clovis	J. M. Bickley
Gallup	Chas. E. Emery
Las Cruces	C. S. Conlee
Raton	E. E. Harrison
Roswell	J. D. Shinkle
Santa Fe	R. P. Sweeney

New York

City	Superintendent
Albany	Austin R. Coulson
Amsterdam	Heth G. Coons
Auburn	Charles G. Hetherington
Baldwin	Arthur E. Newton
Batavia	Clyde P. Wells
Bay Shore	George H. Gatje
Beacon	E. D. Hewes
Binghamton	Daniel J. Kelly
Bronxville	Frederick H. Bair
Buffalo	Robt. T. Bapst
Canandaigua	Arthur E. Warren
Catskill	Maurice S. Hammond
Cedarhurst (Address Lawrence)	Lawrence V. Dodd
Cohoes	William S. Schneider
Corning	William E. Severn (Dist. No. 9) Hugh W. Gregg (Dist. No. 13)
Cortland	E. G. Simmons
Depew	George R. Crego
Dobbs Ferry	John A. McGinness
Dunkirk	Jerome J. Wheeler
East Rochester	Theodore L. R. Morgan
Elmira	Oscar F. Kerlin
Elmira Heights	John W. Sahlstrom
Endicott	Herbert H. Crumb
Floral Park	R. H. Hayden (High)
Fredonia	Claude R. Dye
Freeport	John W. Dodd
Fulton	George R. Bodley
Garden City	Frank R. Wassung
Geneva	W. Lynn Houseman
Glen Cove	H. H. Chapman
Glens Falls	Alexander W. Miller
Gloversville	Harry W. Langworthy
Harrison	Louis M. Klein
Hastings-on-Hudson	John L. Hopkins
Haverstraw	Aloysius J. Lynch
Hempstead	William A. Gore
Herkimer	Henning J. Martin
Hornell	Harrison S. Dodge
Hudson	John T. Kaemmerlen
Hudson Falls	Dana M. King
Huntington	Raymond C. Burdick
Ilion	Earl P. Watkin
Irondequoit	Alfred C. Hamilton (Address Rochester)
Ithaca	Claude L. Kulp
Jamestown	Clinton V. Bush
Johnson City	Howard B. Eccleston
Johnstown	Erle L. Ackley
Kenmore	Frank C. Densberger
Kingston	Arthur J. Laidlaw
Lackawanna	Clarence A. Conway
Lancaster	Frank L. Smith
Lansingburg (Address Troy)	Neil K. White
Little Falls	Harold L. Corzett
Lockport	Clare N. Pettit
Long Beach	Walter J. Schwalje
Lynbrook	H. Arthur Schubert
Malone	Horace H. Lamberton
Mamaroneck	Arthur Z. Boothby
Massena	Martin A. Helfer
Mechanicville	John N. Hayes
Medina	Arthur E. Trippensee
Middletown	Carl V. Warren
Mineola	Harlan B. Allen
Mount Kisco	Harold M. Jennings
Mount Vernon	William H. Holmes
Newark	Edwin R. Woelfel
Newburgh	Snyder J. Gage
New Rochelle	Herbert C. Clish
New York (Address Brooklyn)	Harold G. Campbell
Niagara Falls	James F. Taylor
North Tarrytown	Delbert O. Fuller
North Tonawanda	Bernard A. Leonard
Norwich	Gilbert R. Lyon
Nyack	Kenneth R. MacCalman
Ogdensburg	Frank C. Roda
Olean	Donald M. Keagle
Oneida	Albert H. Covell
Oneonta	George J. Dann
Ossining	Harold V. Loomis
Oswego	Charles E. Riley
Oyster Bay	Leon J. Deming
Patchogue	Sheridan Linn
Peekskill	J. E. Scott
Penn Yan	Clayton E. Rose
Plattsburg	George M. Elmendorf
Port Chester	Evan E. Jones
Port Jervis	Arthur H. Naylor
Poughkeepsie	Fox D. Holden
Rensselaer	Walter S. Clark
Rochester	James M. Spinning
Rockville Center	Floyd B. Watson
Rome	George R. Staley
Roslyn	F. R. Wegner
Rye	A. Verne MacCullough (c)
Salamanca	George A. Place
Saranac Lake	Howard V. Littell
Saratoga Springs	Harris Crandall
Scarsdale	Vernon G. Smith
Schenectady	W. Howard Pillsbury
Scotia	Basil W. Conrad
Seneca Falls	Frank P. Page
Solvay	Clinton H. Atwood
Syracuse	G. Carl Alverson
Tarrytown	Jesse Leroy Thompson
Tonawanda	Henry L. Cecil
Troy	George H. Krug (Union District)
Tuckahoe	Joseph R. Gardner (Dist. No. 1) John C. Goff (Dist. No. 2)
Tupper Lake	Joseph F. Donovan
Utica	John A. De Camp
Valley Stream	Harry W. Gross (c)
Watertown	Charles E. Sabin
Watervliet	William Richmond
Waverly	Don W. McClelland
Wellsville	George F. Jammer
Whitehall	Page E. Cole
White Plains	H. Claude Hardy
Yonkers	Wm. Ward Ankenbrand

North Carolina

City	Superintendent
Asheboro	Reginald Turner
Asheville	R. H. Latham
Burlington	L. E. Spikes
Canton	A. J. Hutchins
Charlotte	H. P. Harding
Concord	A. S. Webb
Durham	W. F. Warren
Elizabeth City	E. E. Bundy
Fayetteville	Horace Sisk
Gastonia	W. P. Grier
Goldsboro	Ray Armstrong
Greensboro	B. L. Smith
Greenville	J. H. Rose
Henderson	E. M. Rollins (a)
Hendersonville	F. M. Waters
Hickory	R. W. Carver
High Point	C. F. Carroll
Kings Mountain	B. N. Barnes
Kinston	W. A. Graham
Lenoir	C. S. Warren
Lexington	L. E. Andrews
Monroe	W. R. Kirkman
Mooresville	H. C. Miller
Morganton	W. S. Hamilton
Mount Airy	L. B. Pendergraph
New Bern	H. B. Smith
Raleigh	Claude F. Gaddy
Reidsville	L. J. Perry
Rocky Mount	R. M. Wilson
Salisbury	J. H. Knox
Shelby	W. E. Abernathy
Statesville	R. M. Gray
Tarboro	W. A. Mahler
Thomasville	J. N. Hauss
Washington	E. S. Johnson
Wilmington	H. M. Roland (a)
Wilson	S. G. Chappell
Winston-Salem	J. W. Moore

North Dakota

City	Superintendent
Bismarck	H. O. Saxvik
Devils Lake	F. H. Gilliland
Dickinson	A. L. Hagen
Fargo	H. H. Kirk
Grand Forks	Elroy Schroeder
Jamestown	Wm. S. Gussner
Mandan	J. C. Gould
Minot	L. A. White
Valley City	G. W. Hanna
Williston	J. N. Urness

Ohio

City	Superintendent
Akron	Ralph H. Waterhouse
Alliance	B. F. Stanton
Ashland	J. E. Bohn
Ashtabula	E. D. Maurice
Athens	Harper C. Pendry
Barberton	U. L. Light
Bedford	A. E. Moody
Bellaire	J. V. Nelson
Bellefontaine	S. A. Frampton
Bellevue	W. L. Arnholt
Berea	J. F. Koeppe
Bexley	H. C. Dieterich
Bowling Green	H. L. Bowman
Bucyrus	D. C. Baer
Cambridge	Hugh R. Hick
Campbell	Andrew S. Klinko
Canton	Jesse H. Mason
Chillicothe	M. M. Berry
Cincinnati	C. V. Courter
Circleville	Frank Fischer
Cleveland	Charles H. Lake
Cleveland Heights	Frank L. Wiley
Columbus	Geo. E. Roudebush
Conneaut	Norman Koontz
Coshocton	A. C. Pence
Cuyahoga Falls	Gilbert Roberts
Dayton	Emerson H. Landis
Defiance	N. G. Fawcett
Delaware	Ervin F. Carlisle
Delphos	Robert H. Christy
Dover	C. E. Palmer
East Cleveland	O. J. Korb
East Liverpool	Herbert G. Means
East Palestine	T. R. Hersh
Elyria	R. C. Maston
Euclid	Russell H. Erwine
Findlay	F. L. Kinley
Fostoria	H. L. Ford
Fremont	U. E. Diener
Galion	O. E. Hill
Gallipolis	E. E. Higgins
Garfield Heights	Harold R. Maurer
Girard	Wilden J. Moore
Grandview Heights (Columbus P. O.)	W. C. Rohleder
Greenville	C. L. Bailey
Hamilton	Clyde W. White
Ironton	John A. Miller
Jackson	T. K. Owens
Kent	J. W. Spangler
Kenton	L. E. McKinley
Lakewood	Geo. A. Bowman
Lancaster	Paul G. Wenger
Lima	J. McLean Reed
Lockland	J. U. Dungan
Logan	G. E. Carr
Lorain	P. C. Bunn
Mansfield	W. L. Miller
Maple Heights	A. E. Hadfield
Marietta	H. L. Sullivan
Marion	E. E. Holt
Martins Ferry	F. L. Teal
Massillon	L. J. Smith
Miamisburg	Harris V. Bear
Middletown	R. W. Solomon
Mingo Junction	M. L. Dennis
Mount Vernon	A. W. Elliott

City	Superintendent
Nelsonville	E. J. Arnold
Newark	Paul B. Edwards
New Boston	J. W. Evans
New Philadelphia	H. S. Carroll
Niles	S. J. Bonham
Norwalk	H. C. Ellis
Norwood	Harold S. Bates
Oakwood (Dayton P. O.)	A. E. Claggett
Painesville	C. C. Pierce
Parma	F. S. Shields
Piqua	G. C. Dietrich
Portsmouth	Frank Appel
Ravenna	H. L. Brown
Reading	H. L. Bussey
Rocky River	J. J. Young
St. Bernard	Chas. W. Howell
St. Marys	C. C. McBroom
Salem	E. S. Kerr
Sandusky	Karl Whinnery
Shaker Heights	Arthur K. Loomis
Shelby	C. G. Keck
Sidney	C. C. Crawford
Springfield	H. L. Stevens
Steubenville	Russell E. Schafer
Struthers	H. E. Zuber
Tiffin	Paul V. Brown
Toledo	E. L. Bowsher
Toronto	S. C. Dennis
Troy	T. E. Hook
Uhrichsville	H. B. Galbraith
Urbana	R. M. Fosnight
Van Wert	C. D. Fox
Wadsworth	Frank H. Close
Wapakoneta	M. R. Simpson
Warren	H. B. Turner
Washington Court House	L. W. Reese
Wellston	H. L. Holter
Wellsville	S. E. Daw
Wilmington	H. W. Hodson
Wooster	C. M. Layton
Xenia	R. J. Warner
Youngstown	Pliny H. Powers
Zanesville	Kenneth C. Ray

Oklahoma

City	Superintendent
Ada	C. D. Procter
Altus	A. G. Steele
Alva	Chas. E. Hinshaw
Anadarko	R. L. McLean
Ardmore	George D. Hann
Bartlesville	M. W. Glasgow
Blackwell	Harry Huston
Bristow	E. H. Black
Chickasha	Bruce J. Myers
Clinton	Arnett Cross
Cushing	William D. Carr
Duncan	N. L. George
Durant	G. T. Stubbs
Elk City	J. E. Holcomb
El Reno	Paul R. Taylor
Enid	DeWitt Waller
Guthrie	W. A. Greene
Henryetta	E. E. Battles
Holdenville	G. S. Sanders
Hugo	Harvey M. Black
Lawton	B. C. Swinney
McAlester	Verl A. Teeter
Miami	R. C. Nichols
Muskogee	J. R. Holmes
Norman	George M. Roberts
Oklahoma City	H. E. Wrinkle
Okmulgee	W. Max Chambers
Pawhuska	Ross C. Kendall
Picher	W. W. Schultz
Ponca City	C. P. Howell
Sand Springs	Clyde A. Boyd
Sapulpa	James L. Prince
Seminole	John G. Mitchell
Shawnee	A. L. Burks
Stillwater	E. D. Price
Tulsa	H. W. Gowans
Wewoka	Harry D. Simmons
Woodward	R. R. Russell

Oregon

City	Superintendent
Albany	R. E. McCormack
Astoria	A. C. Hampton
Baker	A. E. Hirschler
Bend	Howard W. George
Corvallis	J. F. Schenk
Eugene	J. F. Cramer
Klamath Falls	J. P. Wells
La Grande	A. L. Gralapp
Marshfield	Lynn A. Parr
Medford	E. H. Hedrick
Oregon City	J. T. Longfellow
Pendleton	Austin Landreth
Portland	R. E. Dugdale
Salem	Frank B. Bennett
The Dalles	Paul R. McCulloch

Pennsylvania

City	Superintendent
Abington	Joseph C. Weirick
Aliquippa	Lytle M. Wilson
Allentown	Wm. L. Connor
Altoona	Levi Gilbert
Ambridge	J. R. Miller
Archbald	John F. Moran
Arnold	H. L. Holste
Ashland	Joseph H. Davison
Ashley	Robert C. Metz
Avalon	S. Todd Perley
Bangor	Harry O. Eisenberg
Beaver	G. A. McCormick
Beaver Falls	J. Roy Jackson
Bellevue	Harry E. Brumbaugh
Bensalem twp. (Address Cornwells Heights)	Samuel K. Faust
Berwick	M. E. Houck
Bethlehem	William Howard Weiss
Blairsville	N. Montgomery (c)
Blakely Boro. (Address Peckville)	H. B. Anthony
Bloomsburg	L. P. Gilmore (c)
Brackenridge	R. R. Anderson (c)
Braddock	W. C. Evans
Bradford	Floyd C. Fretz
Brentwood	O. H. English (c)
Bridgeport	C. C. Smith
Bristol	Warren P. Snyder
Butler	Roy W. Wiley
Canonsburg	Clinton A. Mathewson
Carbondale	Mary B. McAndrew
Carlisle	J. W. Potter
Carnegie	Norman L. Glasser
Cecil twp. (Address Canonsburg)	H. S. Kuder
Centerville (Address West Brownsville)	C. H. Lyon (c)
Chambersburg	J. Frank Faust
Charleroi	T. L. Pollock
Cheltenham twp. (Address Elkins Park)	Frank C. Ketler
Chester	F. Herman Fritz
Clairton	H. D. Teal
Clearfield	S. F. W. Morrison
Clifton Heights	Chas. A. Brinton (c)
Coaldale	R. B. Harvey (c)
Coal twp. (Address Shamokin)	D. T. Meisberger
Coatesville	H. R. Vanderslice
Collingdale	F. E. Stengle
Columbia	J. B. Kennedy
Connellsville	William G. Davis
Conshohocken	Robert C. Landis
Coraopolis	G. W. Cassler (c)
Corry	Ralph S. Dewey
Crafton	Denton M. Albright
Danville	E. B. Cline (c)
Darby	W. R. Douthett
Derry twp. (Address Hershey)	J. I. Baugher
Dickson City Boro.	P. M. Brennan
Donora	John E. Shambach
Dormont	David H. Stewart
Du Bois	Herbert E. Reisgen
Dunbar twp. (Address Leisenring)	W. E. Tiethohl
Dunmore	J. R. Gilligan
Dupont	C. T. Dugan (c)
Duquesne	Fred C. Gillespie
Duryea	J. J. Joyce (c)
Easton	James C. Bay
East Pittsburgh	Charles F. Young
East Stroudsburg	Carl T. Secor
Edwardsville (Address Kingston)	V. E. Lewis (c)
Ellwood City	J. Ellis Bell
Emaus	H. J. Yeager
Erie	C. Herman Grose
Etna	Clayton L. McMillen
Exeter	John B. Campbell
Farrell	W. W. Irwin
Fell twp. (Address Carbondale)	John H. Campbell
Ford City	Quincey G. Vincent
Forest City	Jules J. Kerl
Forty Fort	Frank W. Walp (c)
Frackville	Wm. R. Trautman (c)
Franklin	Karl M. Russell
Freeland	N. P. Luckenbill (c)
German twp. (Address McClellandtown)	J. Carman Newcomer
Gettysburg	L. C. Keefauver
Glassport	M. J. Naser (c)
Greensburg	Wm. H. McIlhattan
Greenville	A. Bruce Denniston
Grove City	H. W. Traister
Hanover	Robert A. Bagshaw
Harrisburg	R. R. Abernethy
Haverford twp. (Address Upper Darby)	J. Frank Carter
Hazle twp. (Address Hazleton)	Joseph D. Gallagher
Hazleton	Thomas L. Hinkle
Hollidaysburg	Hobson C. Wagner
Homestead	Port Eckles
Honesdale	J. J. Koehler
Huntingdon	J. G. Everard
Indiana	E. C. Perry
Jeannette	Foster B. Snowden
Jersey Shore	Charles W. Potter (c)
Johnsonburg	G. E. Engstrom
Johnstown	J. Ernest Wagner
Kane	Glennis H. Rickert
Kingston	Bela B. Smith
Kittanning	Clyde W. Cranmer
Kulpmont	J. A. Shovlin (c)
Lancaster	Harvey A. Smith
Lansdale	Ralph R. Smith
Lansdowne	S. N. Ewan, Jr.
Lansford	John E. Lauer
Latrobe	John G. Hulton
Lebanon	John W. Hedge
Lehighton	Bert B. David
Lewistown	C. V. Erdly
Lock Haven	J. F. Puderbaugh
Lower Merion twp. (Address Ardmore)	Frank A. Dubois
Luzerne	T. Stuart Williams (c)
Mahanoy City	H. S. Bolan
Mahanoy twp. (Address Mahanoy City)	Jas. P. Noonan
Mauch Chunk twp. (Address Nesquehoning)	Clayton W. Wotring
McAdoo	Sallie L. Ferry (c)
McKeesport	James H. Lawson
McKees Rocks	W. H. Church
Meadville	Warren P. Norton
Mechanicsburg	E. B. Long
Media	Wm. H. Michaels (c)
Middletown	G. W. Feaser
Midland	W. S. Bazard
Millvale	V. C. Holsinger (c)
Milton	Carl L. Millward
Minersville	C. E. Roudabush
Monessen	A. John Goetz
Monongahela	John H. Dorr
Morrisville	M. R. Reiter (c)
Mount Carmel	G. A. Beierschmitt
Mt. Carmel twp. (Address Locust Gap)	P. J. Burke

City	Superintendent
Mount Lebanon twp. (Address Pittsburgh)	H. V. Herlinger
Mount Oliver	A. D. Cleland (c)
Mount Pleasant	J. C. Haberlen
Mount Pleasant twp. (Address Mt. Pleasant)	Lloyd F. Rumbaugh
Muhlenberg twp. (Address Temple)	C. E. Cole
Munhall	Earle O. Liggitt
Nanticoke	A. P. Diffendafer
Nanty-Glo	C. H. Bowers
Nazareth	F. A. Marcks
New Brighton	S. W. Lyons
New Castle	Clyde C. Green
New Kensington	E. T. Chapman
Newport twp. (Address Alden Station)	Andrew E. Rushin
Norristown	H. O. Dietrich
Northampton	G. A. Eichler
North Braddock (Address Braddock)	F. D. Zuerner
North Huntingdon twp. (Address Irwin)	Carl C. Pearsall
Oakmont	W. Lee Gilmore
Oil City	Vaughn R. DeLong
Old Forge	B. T. Harris
Olyphant	John A. Dempsey
Palmerton	J. N. Roeder
Philadelphia	A. J. Stoddard
Phoenixville	Martin L. Peters
Pitcairn	R. L. Roose (c)
Pittsburgh	Ben G. Graham
Pittston	Elizabeth G. Battle
Plains	M. V. Hughes (c)
Plymouth	H. S. Jones
Pottstown	Frank M. Haiston
Pottsville	L. A. BuDahn
Punxsutawney	James T. Downie
Radnor twp. (Address Wayne)	Sydney V. Rowland
Rankin (Address Braddock)	Dennis J. Sullivan
Reading	Thomas Henry Ford
Ridgway	A. C. Nelson
Rochester	Robert P. Barner
Rostraver twp. (Address Belle Vernon, R.D. #1)	Ernest Frank Carter
St. Clair	Charles R. Birch
St. Marys	L. T. Kelly (c)
Sayre	L. E. DeLaney
Schuylkill Haven	Paul S. Christman (c)
Scottdale	S. B. Bulick
Scranton	John H. Dyer
Sewickley	L. H. Conway (c)
Shamokin	P. E. Witmeyer
Sharon	W. D. Gamble
Sharpsburg	Joseph S. McDonald (c)
Sharpsville	Harry E. Pebly (c)
Shenandoah	A. J. Ratchford
South Williamsport	A. B. Elder (c)
Springfield twp. (Address Chestnut Hill)	A. L. Gehman
Steelton	Orris H. Aurand
Stowe twp. (Address McKees Rock)	Gale F. Stroup
Stroudsburg	Robert Brown
Summit Hill	E. T. McCready
Sunbury	Oliver C. Kuntzleman
Swissvale	C. S. Baily
Swoyerville	Henry R. Horvat (c)
Tamaqua	F. G. Horner
Tarentum	A. D. Endsley
Taylor	W. J. Powell
Throop	John J. O'Hara
Titusville	John H. Linton
Tredyffrin twp. (Address Berwyn)	Wilmer K. Groff
Turtle Creek	W. W. Lantz (c)
Tyrone	Norman Miller
Uniontown	J. N. Mowls
Upper Darby	William C. Sampson
Upper Merion twp. (Address Bridgeport)	Warren A. Cocklin (c)
Vandergrift	John R. Kurtz
Warren	J. G. Rossman
Washington	Meyers B. Horner
Waynesboro	Walter C. Richter
West Chester	G. Arthur Stetson
West Deer twp. (Address Russellton)	Berger Franklin Edlund
West Hazleton	August Martin (c)
West Mahanoy twp. (Address Lost Creek)	Henry F. Murray
West Pittston	R. J. W. Templin
West View	M. J. Horsch (c)
West York	A. H. Martin (c)
Whitehall twp. (Address Egypt)	Clarence M. Gockley
Wilkes-Barre	A. E. Bacon
Wilkinsburg	W. C. Graham
Williamsport	A. M. Weaver
Wilmerding	N. I. Reist (c)
Wilson Boro (Address Easton)	C. E. Furst
Windber	Joseph L. Hackenberg
Winton Boro (Address Jessup)	J. L. McCloskey
Yeadon	R. H. Koch
York	A. W. Ferguson

Rhode Island

City	Superintendent
Barrington	Carl H. Porter-Shirley
Bristol	E. S. Mapes
Burrillville	J. C. Sweeney
Central Falls	James E. Martin
Coventry	R. E. E. Campbell
Cranston	C. W. Bosworth
Cumberland	Bernard F. Norton
East Providence	J. R. D. Oldham
Johnston	Aaron F. DeMoranville
Lincoln (Address Lonsdale)	John L. Smith
Newport	Harold T. Lowe
North Providence	James L. McGuire
Pawtucket	Frank A. R. Allen
Providence	James L. Hanley
South Kingstown	E. K. Wilcox
Tiverton	Lewis M. Wager
Warren	Harold D. Chittim
Warwick	Warren A. Sherman
Westerly	Willard H. Bacon
West Warwick	Maisie E. Quinn
Woonsocket	Leon M. Farrin

South Carolina

City	Superintendent
Aiken	L. K. Hagood
Anderson	E. C. McCants
Camden	J. G. Richards, Jr.
Charleston	A. B. Rhett
Chester	Myron E. Brockman
Clinton	W. E. Monts
Columbia	A. C. Flora
Darlington	J. C. Daniel
Florence	John W. Moore
Gaffney	L. F. Carson
Georgetown	W. C. Bynum
Greenville	W. F. Loggins
Greenwood	W. E. Black
Hartsville	J. H. Thornwell
Laurens	C. K. Wright
Newberry	O. B. Cannon
Orangeburg	A. J. Thackston
Rock Hill	W. C. Sullivan
Spartanburg	L. W. Jenkins
Sumter	W. H. Shaw
Union	T. C. Jolly, Jr.

South Dakota

City	Superintendent
Aberdeen	C. J. Dalthorp
Huron	Andrew J. Lang
Lead	R. V. Hunkins
Mitchell	John C. Lindsey
Rapid City	E. B. Bergquist
Sioux Falls	W. I. Early
Watertown	H. Mackenzie
Yankton	Barret Lowe, Acting

Tennessee

City	Superintendent
Alcoa	V. F. Goddard
Athens	J. C. Ridenour
Bristol	J. H. Arrants
Chattanooga	W. T. Robinson
Clarksville	C. H. Moore
Cleveland	R. T. Allen
Columbia	J. R. Baker (a)
Dyersburg	C. M. Walker
Elizabethton	E. L. Bowers
Greeneville	Mac Alexander
Jackson	C. B. Ijams
Johnson City	C. E. Rogers
Kingsport	R. N. Robinson
Knoxville	Harry Clark
Memphis	Ernest C. Ball
Morristown	Carl T. Vance
Murfreesboro	J. C. Mitchell
Nashville	W. A. Bass
Paris	W. O. Inman
Shelbyville	Troy G. Young
Springfield	W. M. Overcash
Union City	T. D. Ozment

Texas

City	Superintendent
Abilene	L. E. Dudley
Amarillo	C. M. Rogers
Austin	A. N. McCallum
Beaumont	E. W. Jackson
Big Spring	W. C. Blankenship
Bonham	I. B. Carruth
Borger	W. A. McIntosh
Breckenridge	Jno. F. Bailey
Brenham	C. M. Selman
Brownsville	E. C. Dodd
Brownwood	E. J. Woodward
Bryan	W. D. Wilkerson
Childress	Chas. E. Damron
Cisco	R. N. Cluck
Cleburne	Emmett Brown
Coleman	J. T. Runkle
Corpus Christi	R. B. Fisher
Corsicana	W. H. Norwood
Crystal City	S. H. Fly
Dallas	Julius Dorsey, Acting
Del Rio	Drury Wood
Denison	B. M. McDaniel
Denton	R. C. Patterson
Eagle Pass	F. R. Thompson
Electra	B. M. Dinsmore
El Paso	A. H. Hughey
Ennis	C. C. Isbell
Fort Worth	W. M. Green
Gainesville	H. O. McCain
Galveston	S. B. Graham
Goose Creek	N. S. Holland
Greenville	H. H. Chambers
Harlingen	E. C. Deering
Highland Park (Address Dallas)	H. E. Gable
Hillsboro	Loy W. Hartsfield
Houston	E. E. Oberholtzer
Huntsville	R. M. Hawkins
Jacksonville	Larue Cox
Kingsville	C. E. Wade
Laredo	W. P. Galligan
Longview	Henry L. Foster
Lubbock	W. B. Irvin
Lufkin	I. A. Coston
Luling	R. A. Box
Marlin	H. J. McIlhany
Marshall	E. N. Dennard
McAllen	John H. Gregory
McKinney	Jack R. Ryan
Mercedes	Ernest H. Poteet
Mexia	Frank L. Williams
Midland	W. W. Lackey
Mineral Wells	W. A. Ross
Mission	H. C. Proctor
Nacogdoches	Rufus E. Price
Navasota	J. T. Ferguson
New Braunfels	E. A. Sahm
Orange	J. W. Edgar
Palestine	Bonner Frizzell
Pampa	L. L. Sone
Paris	A. H. Chamness
Plainview	O. J. Laas
Port Arthur	G. M. Sims
Ranger	W. T. Walton

City	Superintendent
San Angelo	Bryan Dickson
San Antonio	L. E. Stutsman
San Benito	Grady St. Clair
San Marcos	Fred Kaderli
Seguin	Joe F. Saegert
Sherman	R. L. Speer
Sour Lake	J. L. Johnson
Sulphur Springs	L. L. Thomas
Sweetwater	R. S. Covey
Taylor	E. T. Robbins
Temple	Joe R. Humphrey
Terrell	J. E. Langwith
Texarkana	H. W. Stilwell
Tyler	J. M. Hodges
Uvalde	Guy D. Dean
Vernon	C. H. Dillehay
Victoria	J. H. Bankston
Waco	R. H. Brister
Waxahachie	T. C. Wilemon
Wichita Falls	H. D. Fillers
Yoakum	G. P. Barron

Utah

City	Superintendent
Brigham	Hervin Bunderson (a)
Logan	E. Allen Bateman
Murray	James Clove
Ogden	W. Karl Hopkins
Provo	J. C. Moffitt
Salt Lake City	L. John Nuttall, Jr.
Tooele	Sterling Harris

Vermont

City	Superintendent
Barre	Wm. H. Carter
Bellows Falls (Address Rockingham)	Homer B. Ashland
Bennington	Winn L. Taplin
Brattleboro	G. W. Powers
Burlington	Lyman C. Hunt
Montpelier	W. A. Kincaid
Newport	Lynford L. Wells
Rockingham	Natt B. Burbank
Rutland	W. W. Fairchild
St. Albans	Josiah S. McCann
St. Johnsbury	Frank R. Adams
Springfield	Lyman W. Bole
Winooski	G. R. Stackpole

Virginia

City	Superintendent
Alexandria	T. C. Williams
Bristol	B. D. French
Charlottesville	James G. Johnson,
Clifton Forge	Herman Blankinship
Covington	A. L. Bennett (a)
Danville	G. L. H. Johnson
Fredericksburg	G. H. Brown
Hampton	Robert M. Newton (a)
Harrisonburg	W. H. Keister
Hopewell	R. W. Copeland (a)
Lynchburg	Omer Carmichael
Martinsville	E. E. Givens
Newport News	J. H. Saunders
Norfolk	C. W. Mason
Petersburg	Henry G. Ellis
Portsmouth	Harry A. Hunt
Pulaski	Frank J. Critzer
Radford	F. O. Wygal
Richmond	J. H. Binford
Roanoke	D. E. McQuilkin
South Norfolk	T. C. Anderson
Staunton	L. F. Shelburne
Suffolk	S. T. Godbey
Waynesboro	R. C. Jennings
Winchester	G. R. Quarles

Washington

City	Superintendent
Aberdeen	Edward F. Bloom
Anacortes	De Fore Cramblitt
Bellingham	C. Paine Shangle
Bremerton	Tillman Peterson
Centralia	Paul F. Ferguson
Everett	J. A. Reeves
Hoquiam	H. C. Crumpacker
Kelso	C. H. Lillie
Longview	E. J. McNamara
Olympia	L. P. Brown
Port Angeles	F. W. Breakey
Puyallup	P. B. Hanawalt
Seattle	Worth McClure
Spokane	O. C. Pratt
Tacoma	Howard R. Goold
Vancouver	Paul F. Gaiser
Walla Walla	W. A. Lacey
Wenatchee	W. B. Smith
Yakima	A. C. Davis

West Virginia

City	Superintendent
Beckley	E. Van Dorsey (a)
Bluefield (Address Princeton)	C. H. Archer (a)
Charleston	Virgil L. Flinn (a)
Clarksburg	Arthur V. G. Upton (a)
Elkins	Bryan Hamilton (a)
Fairmont	J. J. Straight (a)
Grafton	E. G. Kuhn (a)
Hinton	Mrs. Margaret Nicely Leidig (a)
Huntington	O. C. Nutter (a)
Keyser	Paul C. Rouzer (a)
Martinsburg	G. Wm. Ropp (a)
Morgantown	Robert Clark (a)
Moundsville	Louis R. Potts (a)
Parkersburg	John A. Davis, Jr. (a)
Princeton	C. H. Archer (a)
Richwood (Address Summerville)	James L. Creasy (a)
South Charleston (Address Charleston)	Virgil Flinn (a)
Weirton	A. L. Rabenstein (a)
Welch	George W. Bryson (a)
Wellsburg	Olen Rutan (a)
Weston	Robert T. Crawford (a)
Wheeling	J. P. McHenry (a)
Williamson	C. O. Batson (a)

Wisconsin

City	Superintendent
Antigo	P. A. Tipler
Appleton	Ben J. Rohan
Ashland	George A. Bassford
Baraboo	Gordon L. Willson
Beaver Dam	A. H. Luedke
Beloit	V. F. Dawald
Chippewa Falls	Robert F. Lohrie
Cudahy	J. E. Jones
De Pere	T. J. McGlynn
Eau Claire	Alvin T. Stolen
Fond du Lac	L. P. Goodrich
Fort Atkinson	Frank C. Bray
Green Bay	G. E. Denman
Janesville	V. E. Klontz
Kaukauna	J. F. Cavanaugh
Kenosha	G. F. Loomis
La Crosse	G. M. Wiley
Madison	Philip H. Falk
Manitowoc	Hugh S. Bonar
Marinette	W. F. Waterpool
Marshfield	E. L. Giroulx
Menasha	F. B. Younger
Menomonie	W. G. Ballentine
Merrill	George F. Brooks
Milwaukee	M. C. Potter
Monroe	E. O. Evans
Neenah	C. F. Hedges
Oconto	L. W. Fulton
Oshkosh	Charles C. Bishop
Portage	A. J. Henkel
Racine	Wm. C. Giese
Rhinelander	W. F. Kruschke
Rice Lake	J. H. Murphy
Sheboygan	H. E. Smith
Shorewood	H. S. Hemenway
South Milwaukee	John P. Mann
Stevens Point	P. M. Vincent
Superior	W. R. Davies
Two Rivers	Fred G. Bishop
Watertown	R. A. Buell
Waukesha	R. F. Lewis
Waupun	H. C. Wegner
Wausau	E. C. Hirsch
Wauwatosa	G. E. Watson
West Allis	H. B. Nash
Whitefish Bay (Address Milwaukee)	C. L. Mulrine
Wisconsin Rapids	Floyd Smith

Wyoming

City	Superintendent
Casper	Dean C. Morgan
Cheyenne	J. L. Goins
Laramie	A. A. Slade
Rock Springs	E. M. Thompson
Sheridan	J. J. Early

References

(a) County superintendent. (b) Parish superintendent. (c) Supervising principal.

SECTION XVII
SUPERINTENDENTS OF CATHOLIC PAROCHIAL SCHOOLS

In the following list the names of the archdioceses and dioceses appear in capitals at the left margin. Archdioceses are asterisked.

DIOCESAN SUPERINTENDENTS OF SCHOOLS

Alabama

MOBILE—Rev. Leo M. Byrnes, Superintendent of Parochial Schools, 400 Government Street, Mobile, Ala.

Arizona

TUCSON—Rev. Bernard L. Gordon, Chancellor, 192 South Stone Avenue, Tucson, Ariz.

Arkansas

LITTLE ROCK—Very Rev. Msgr. John J. Healy, Diocesan Superintendent of Schools, 2501 State St., Little Rock, Ark.

California

LOS ANGELES *—Rev. Patrick J. Dignan, Diocesan Superintendent of Schools, 714 West Olympic Boulevard, Los Angeles, Calif.

SAN FRANCISCO *—Rev. James H. Long, M.A., Diocesan Superintendent of Schools, 50 Oak Street, San Francisco, Calif.

MONTEREY and FRESNO—Very Rev. Msgr. James Dowling, M.A., Diocesan Superintendent of Schools, 1152 R Street, Fresno, Calif.

SACRAMENTO—Rev. Raymond Renwald, Diocesan Superintendent of Schools, Box 1706, Sacramento, Calif.

SAN DIEGO—Rev. Kenneth G. Stack, Diocesan Superintendent of Schools, 1528 Fourth Avenue, San Diego, Calif.

Colorado

DENVER—Rev. M. Hubert Newell, Diocesan Superintendent of Schools, 230 East 17th Avenue, Denver, Colo.

Connecticut

HARTFORD—Rev. Austin Munich, Diocesan Supervisor of Schools, St. Thomas Seminary, Bloomfield, Conn.

Delaware

WILMINGTON—Rev. Leo W. O'Neill, Diocesan Superintendent of Schools, Hockessin, Dela.

Florida

ST. AUGUSTINE—Rt. Rev. P. J. McGill, Chancellor, St. Augustine's Cathedral, St. Augustine, Fla.

Georgia

SAVANNAH-ATLANTA—Rt. Rev. Msgr. T. James McNamara, Diocesan Superintendent of Schools, 222 E. Harris St., Savannah, Ga.

Idaho

BOISE—Rt. Rev. Joseph P. O'Toole, Superintendent of Schools, 804 N. 9th Street, Boise, Idaho.

Illinois

CHICAGO *—Very Rev. Msgr. D. F. Cunningham, M.A., LL.D., Diocesan Superintendent of Schools, 755 North State Street, Chicago, Ill.

BELLEVILLE—Very Rev. Msgr. John J. Fallon, M.A., Diocesan Superintendent of Schools, 63d and West Main Streets, Belleville, Ill.

PEORIA—Rev. M. J. Haddigan, Diocesan Superintendent of Schools, 405 Smith Street, Peoria, Ill.

ROCKFORD—Rev. William J. Donovan, Diocesan Superintendent of Schools, 95 East Wilson Street, Batavia, Ill.

SPRINGFIELD—Rev. George M. Link, Director of Education, Grafton, Ill.

Indiana

FORT WAYNE—Rev. Thomas E. Dillon, Superintendent of Catholic Schools, % Our Sunday Visitor, Huntington, Ind.

INDIANAPOLIS—Rev. Leonard Wernsing, Diocesan Superintendent of Schools, 144 West Georgia Street, Indianapolis, Ind.

Iowa

DUBUQUE *—Rt. Rev. Msgr. John M. Wolfe, Diocesan Superintendent of Schools, 11th and Bluff Streets, Dubuque, Ia.

DAVENPORT—Rev. Edward J. Butler, Diocesan Superintendent of Schools, Cosgrove Building, Davenport, Iowa.

DES MOINES—Rev. L. V. Lyons, Diocesan Superintendent of Schools, 607 High Street, Des Moines, Iowa.

SIOUX CITY—Rev. C. Ivis, Diocesan Superintendent of Schools, St. Anthony's Home, Sioux City, Iowa.

Kansas

CONCORDIA—Rev. Michael J. Hogan, Diocesan Superintendent of Schools, St. Joseph's Hospital, Concordia, Kans.

LEAVENWORTH—Very Rev. William T. C. Boland, President of the School Board, 709 N. 5th Street, Leavenworth, Kans.

WICHITA—Rev. Leon A. McNeill, Diocesan Superintendent of Education, 424 N. Broadway, Wichita, Kans.

Kentucky

LOUISVILLE *—Rev. Felix N. Pitt, Ph.D., Secretary of Louisville Catholic School Board, 443 South Fifth Street, Louisville, Ky.

COVINGTON—Rev. Leo J. Streck, Diocesan Superintendent of Schools, 1110 Madison Avenue, Covington, Ky.

OWENSBORO—Same as the Archdiocese of Louisville.

Louisiana

NEW ORLEANS *—Rev. Edward C. J. Prendergast, Superintendent of Catholic Schools, 7845 Apricot Street, New Orleans, La.

ALEXANDRIA—Rev. J. E. Howard, Chancellor, 1805 Jackson Avenue, Alexandria, La.

LAFAYETTE—Rev. J. Clifford Gaudin, Bishop's House, The Cathedral, Lafayette, La.

Maine

PORTLAND—Rev. John J. Barrett, Diocesan Superintendent of Schools, 307 Congress Street, Portland, Maine.

Maryland

BALTIMORE AND WASHINGTON *—Rt. Rev. Msgr. John I. Barrett, Ph.D., J.C.L., Diocesan Superintendent of Schools, 415 Cathedral Street, Baltimore, Md.

Massachusetts

BOSTON *—Rt. Rev. Msgr. Richard Quinlan, S.T.L., Diocesan Superintendent of Schools, 75 Union Park Street, Boston, Mass.

FALL RIVER—Rev. Edward J. Gorman, M.A., Superintendent of Diocesan Schools, 162 Walnut Street, Fall River, Mass.

SPRINGFIELD—Rev. Dr. John R. Rooney, Diocesan Superintendent of Schools, College of Our Lady of the Elms, Chicopee Falls, Mass.

Michigan

DETROIT *—Rev. Carroll F. Deady, Ph.D., Diocesan Superintendent of Schools, 1234 Washington Boulevard, Detroit, Mich.

GRAND RAPIDS—Rev. E. L. Quaderer, Diocesan Superintendent of Schools, 385 Leonard Street, N. E., Grand Rapids, Mich.

LANSING—Rev. Jerome MacEachin, Diocesan Superintendent, 92 Capital Avenue, N.E., Battle Creek, Mich.

MARQUETTE—Rev. Martin Melican, Superintendent of Parochial Schools, Holy Family Orphan's Home, Marquette, Mich.

SAGINAW—Rev. John J. Sonefeld, Chancellor, 124 North Hamilton Street, Saginaw, Mich.

Minnesota

ST. PAUL *—Rev. Roger J. Connole, Ph.D., Diocesan Superintendent of Schools, 240 Summit Avenue, St. Paul, Minn.

CROOKSTON—Rev. Victor Miller, Diocesan Superintendent of Schools, St. Joseph's Church, Ada, Minn.

DULUTH—Rev. Martin P. Larkin, Superintendent of Catholic Schools, 211 West 4th Street, Duluth, Minn.

ST. CLOUD—Rev. T. Leo Keaveny, Ph.D., Diocesan Superintendent of Schools, Cathedral Rectory, 312 Seventh Avenue N., St. Cloud, Minn.

WINONA—Rev. R. J. Jansen, Diocesan Director, 819 2nd Street, Rochester, Minn.

Mississippi

NATCHEZ—Rev. D. J. O'Beirne, Chancellor, Bishop's House, 107 South Union Street, Natchez, Miss.

Missouri

ST. LOUIS—Very Rev. James P. Murray, Superintendent of Parish Schools, 2709 Clara Avenue, St. Louis, Mo.

KANSAS CITY—Rev. John J. Murphy, Diocesan Superintendent of Schools, 3142 Broadway, Kansas City, Mo.

ST. JOSEPH—Rev. Joseph W. Helmes, Ph.D., Director of Charities, 519 10th Street, St. Joseph, Mo.

Montana

GREAT FALLS—Rev. E. B. Schuster, Vice-Chancellor and Secretary, 725 Third Avenue, N., Great Falls, Mont.

HELENA—Rev. J. A. Rooney, M.A., S.T.L., Diocesan Superintendent of Schools, 1306 North Main Street, Walkerville, Mont.

Nebraska

GRAND ISLAND—Rev. Anthony E. Egging, Diocesan Superintendent of Schools, St. Patrick's Rectory, Sidney, Nebr.

LINCOLN—Very Rev. Msgr. L. V. Barnes, M.A., Diocesan Superintendent of Schools, 514 South 18th Street, Lincoln, Nebr.

OMAHA—Rev. Joseph H. Ostdiek, Diocesan Superintendent of Schools, 2507 Cass Street, Omaha, Nebr.

Nevada

RENO—Very Rev. Robert J. Harrigan, Chancellor and Secretary, P. O. Box 1050, Reno, Nev.

New Hampshire

MANCHESTER—Diocesan Superintendent of Schools, % The Chancellor, 145 Lowell Street, Manchester, N. H.

New Jersey

NEWARK *—Very Rev. Msgr. Wm. F. Lawlor, LL.D., Diocesan Superintendent of Schools, 3[illegible] Mulberry Street, Newark, N. J.

CAMDEN—Rev. Wm. J. Hickey, Diocesan Superintendent of Schools, 10 North Myrtle Street, Vineland, N. J.

PATERSON—Rev. Walter H. Hill, Diocesan Superintendent of Schools, 24 De Grasse Street, Paterson, N. J.

TRENTON—Rev. Robert J. Graham, M.A., Superintendent of Diocesan Schools, 85 West High Street, Somerville, N. J.

New Mexico

SANTA FE *—Rev. Clarence Schoeppner, Chancellor, Box 707, Santa Fe, N. Mex.

GALLUP—Rev. Pax R. Schecker, O.F.M., Chancellor, Cathedral of the Sacred Heart, Gallup, N. Mex.

New York

NEW YORK *—Rev. William R. Kelly, M.A., Diocesan Superintendent of Schools, 23 East 51st Street., New York, N. Y.

ALBANY—Rev. James P. Hanrahan, M.A., Superintendent of Parish Schools, 695 Fifth Avenue, Watervliet, N. Y.

BROOKLYN—Rt. Rev. Msgr. Joseph V. S. McClancy, LL.D., Diocesan Superintendent of Schools, 75 Greene Avenue, Brooklyn, N. Y.

BUFFALO—Rev. John W. Peel, Superintendent of Parochial Schools, 35 Niagara Square, Buffalo, N. Y.

OGDENSBURG—Rt. Rev. Msgr. John M. Hogan, Diocesan Superintendent of Schools, 232 Washington Street, Ogdensburg, N. Y.

ROCHESTER—Rev. John M. Duffy, Diocesan Superintendent of Schools, 50 Chestnut Street, Rochester, N. Y.

SYRACUSE—Rev. David C. Gildea, M.A., J.C.L., S.T.B., Diocesan Superintendent of Schools, 257 E. Onondaga Street, Syracuse, N. Y.

North Carolina

RALEIGH—Rev. Michael J. Begley, Diocesan Superintendent of Schools, Wrightsville, N. C.

BELMONT ABBEY NULLIUS—Rev. Thomas Oestreich, O.S.B., S.T.D., Chancellor, Belmont, N. C.

North Dakota

BISMARCK—Rev. Bonaventure Goebel, O.S.B., Chancellor, St. Alexius Hospital, Bismarck, N. Dak.

FARGO—Rev. William T. Mulloy, Diocesan Superintendent of Schools, 723 Kittson Avenue, Grafton, N. Dak.

Ohio

CINCINNATI *—Rev. Carl J. Ryan, Ph.D., Diocesan Superintendent of Schools, 28 Calhoun Street, Cincinnati, Ohio.

CLEVELAND—Rt. Rev. Msgr. John R. Hagan, Ph.D., Diocesan Superintendent of Schools, 621 N. B. C. Building, Cleveland, Ohio.

COLUMBUS—Rt. Rev. Msgr. John J. Murphy, Diocesan Superintendent of Schools, 1651 East Main Street, Columbus, Ohio.

TOLEDO—Rev. Norbert M. Shumaker, Ph.D., Diocesan Superintendent of Catholic Schools, 807 Superior Street, Toledo, Ohio.

Oklahoma

OKLAHOMA CITY and TULSA—Rev. J. B. Dudek, Chancellor, 1521 N. Hudson Street, Oklahoma City, Okla.

Oregon

PORTLAND *—Rev. Arthur J. Sullivan, Diocesan Superintendent of Schools, 2053 S. W. 6th Avenue, Portland, Ore.

BAKER CITY—Rev. John J. Delahunty, Chancellor, Baker, Ore.

Pennsylvania

PHILADELPHIA *—Rt. Rev. Msgr. John J. Bonner, D.D., LL.D., Superintendent of Parochial Schools, 19th and Wood Streets, Philadelphia, Pa.

ALTOONA—Rev. Francis McNelis, Diocesan Superintendent of Schools, 511 20th Street, Altoona, Pa.

ERIE—Rev. Joseph J. Wehrle, S.T.D., Superintendent of Catholic Schools, 225 West 9th Street, Erie, Pa.

HARRISBURG—Rev. Harold E. Keller, Diocesan Superintendent of Schools, 21st and Market Streets, Harrisburg, Pa.

PITTSBURGH—Rev. Thomas Quigley, Diocesan Superintendent of Schools, 5325 Penn. Avenue, Pittsburgh, Pa.

SCRANTON—Rev. J. J. Featherstone, M.A., J.C.L., Diocesan Superintendent of Schools, 401 Linden Street, Scranton, Pa.

Rhode Island

PROVIDENCE—Rev. Thomas V. Cassidy, M.A., S.T.L., Diocesan Superintendent of Schools, 25 Fenner Street, Providence, R. I.

South Carolina

CHARLESTON—Rt. Rev. Joseph L. O'Brien, Diocesan Superintendent of Schools, 136 St. Philip Street, Charleston, S. C.

South Dakota

RAPID CITY—Rev. Michael T. Costigan, Chancellor, 1622 West Boulevard, Rapid City, S. Dak.

SIOUX FALLS—Rt. Rev. Msgr. W. S. O'Meara, Diocesan Superintendent of Schools, Watertown, S. Dak.

Tennessee

NASHVILLE—Rev. George J. Flanigen, Diocesan Superintendent of Schools, 328 Fifth Avenue N., Nashville, Tenn.

Texas

SAN ANTONIO *—President of the School Board, 230 Dwyer Avenue, San Antonio, Texas.

AMARILLO—Rev. John Rogg Schmidt, J.C.L., Vice-Chancellor, Box 2009, Amarillo, Texas.

CORPUS CHRISTI—Rev. James H. Kelly, Diocesan Superintendent of Schools, P. O. Box 284, Rockport, Texas.

DALLAS—Rev. Thomas S. Zachry, Diocesan Superintendent of Schools, 2215 Ross Avenue, Dallas, Texas.

EL PASO—Very Rev. J. C. M. Garde, Chancellor, 1012 North Mesa Avenue, El Paso, Texas.

GALVESTON—Rt. Rev. Jacob Schnetzer, Diocesan Superintendent of Schools, 4015 Sherman Avenue, Houston, Texas.

Utah

SALT LAKE—Rev. Thomas F. Butler, Diocesan Superintendent of Schools, 650 S. 11th East Street, Salt Lake City, Utah.

Vermont

BURLINGTON—Very Rev. William P. Crosby, President of the School Board, 7 Fullerton Avenue, Montpelier, Vt.

Virginia

RICHMOND—Rev. Francis J. Byrne, Diocesan Superintendent of Schools, 811 Cathedral Place, Richmond, Va.

Washington

SEATTLE—Rev. Edward J. McFadden, Diocesan Superintendent of Schools, 907 Terry Avenue, Seattle, Wash.

SPOKANE—Rev. Roy E. Thelen, Chancery Office, 1115 West Riverside Avenue, Spokane, Wash.

West Virgina

WHEELING—Rev. John J. O'Brien, Superintendent of Parochial Schools, 464 Washington Avenue, Clarksburg, W. Va.

Wisconsin

MILWAUKEE *—Rev. Edmund J. Goebel, Diocesan Superintendent of Schools, 625 North Milwaukee Street, Milwaukee, Wis.

GREEN BAY—Rev. E. J. Westenberger, Ph.D., Diocesan Superintendent of Schools, 131 South Madison Street, Green Bay, Wis.

LA CROSSE—Rev. Lester W. Seemann, Diocesan Superintendent of Schools, Box 664, La Crosse, Wis.

SUPERIOR—Rev. Joseph Annabring, Diocesan Superintendent of Schools, 1201 Hughitt Avenue, Superior, Wis.

Wyoming

CHEYENNE—Rev. James A. Hartmann, Chancellor, 2105 Capitol Avenue, Cheyenne, Wyo.

SECTION XVIII

AIDS AVAILABLE TO LOCAL SCHOOL BOARDS FROM STATE DEPARTMENTS

PARTICIPATION OF STATE AGENCIES IN PLANNING AND SUPERVISING LOCAL SCHOOL-BUILDING DEVELOPMENT

IN the planning of buildings for a public school system, it frequently is desirable to know the degree to which the state board of education has provided for participation and cooperation. The following summary segregates the character of the supervision given by the state and its representative agencies under three headings. The first item indicates the action which the state board may be expected to take. The second item shows the part played by the state superintendent of schools as the official spokesman for the state department of education. In the third part will be found indications of the assistance or guidance which other state agencies will give. The form of tabulation has necessitated very brief statements covering these responsibilities, but the degree and character of participation are clearly shown for each state. The list has been revised up to December, 1940.

THE STATES' PARTICIPATION IN SCHOOL-BUILDING CONSTRUCTION

Alabama

State Board of Education, Montgomery
Approves rules and regulations submitted by state superintendent.
State Superintendent of Education, A. H. Collins
Prepares and submits to the state board of education rules and regulations pertaining to: operation of state minimum program; minimum standards for school sites; minimum standards for plans, specifications, and construction of school buildings; for the issuance of warrants for capital outlay purposes. Recommends school legislation to Legislature.
Schoolhouse planning is a service in the division of administration and finance. In addition to the preparation of rules and regulations as listed above, the following services are rendered:
Plans and specifications are prepared for rural school building construction.
Plans and specifications prepared by private architects are approved.
Buildings in process of construction are inspected upon request to determine whether plans and specifications are being followed.
Rules and regulations of the state board are administered to insure the proper execution.
School surveys set up a practicable long-time program for locating school centers, for school-building construction and maintenance, for tax districts, for school finance, for capital outlay debt service, for safe and adequate school transportation where needed, for the teaching personnel, for child accounting, and for record keeping. The state institutions of higher learning cooperate in furnishing trained and experienced consultants on survey work. No capital outlay expenditures can be made except at school centers approved by the survey program. The school-building program is determined in terms of the curriculum, road conditions, public school fund, and transportation which may be made available.
Each county is required to submit annually a building and capital outlay program which must be approved before actual work on the program is undertaken.
Director of the Division of Administration and Finance, R. L. Johns
Supervisor of Research and Surveys, A. R. Meadows
Supervisor of Schoolhouse Planning, R. E. Ledbetter
Architect, Clyde C. Pearson

Arizona

State Board of Education, Phoenix
No jurisdiction whatever in regard to buildings erected by districts.
State Superintendent of Public Instruction, E. D. Ring
No jurisdiction.
Other Agencies
Board of health issues regulations.

Arkansas

State Board of Education, Little Rock
Has a division of school grounds and schoolhouse planning.
Director prepares plans for 1- to 7-teacher buildings, and for such buildings as teachers' homes, shops, home economics buildings, gymnasiums, etc.
Furnishes preliminary sketches of floor plans for larger buildings.
Checks architects' plans for school buildings upon request.
Advises school officials as to plans for remodeling, repairing and altering school buildings.
Advises superintendents and teachers as to interior arrangements, furniture and equipment.
Superintends the construction of all school buildings during progress of erection, except when the district employs an architect.
State Commissioner, T. H. Alford
No legal provision for approval.
Director, School Plant Division, J. L. Taylor

California

State Superintendent of Public Instruction, Walter F. Dexter, Sacramento
Division of schoolhouse planning passes on all plans costing more than $5,000, excepting those in the largest cities; is called into consultation by city districts, and controls other situations by surveys.
Site sizes and locations controlled by state standards.
School sites may not be purchased in non-city districts until written report and recommendation made by Division of Schoolhouse Planning (1939).
No building contract, in situations coming under the department's jurisdiction, is legal without the required approval.
This department does not make a practice of furnishing working drawings.
Chief of Division of Schoolhouse Planning, Dr. Charles W. Bursch
Architect, Doyt Early

Colorado

State Superintendent of Public Instruction, Mrs. Inez Johnson Lewis, Denver
School building handled by local boards of education.

Connecticut

State Board of Education, Hartford
Has a section of buildings and plans which approves plans for enlargement and new construction. It inspects school buildings for safety.
Publishes standards for guidance of local boards.

Has architect to whom plans are referred.
Assists local communities in building surveys.
State Commissioner, A. G. Grace
Supervisor of Buildings and Plans, John E. Nichols

Delaware

State Board of Education, Dover
Outside Wilmington prepares a tentative program of school building to submit to local boards.
Hears comments and suggestions thereon.
Creates standards with effect of law, governing hygienic, sanitary, and protective construction; selection, arrangement, and maintenance of sites; condemns school buildings.
Has approval of plans and specifications.
State Superintendent of Public Instruction, Dr. H. V. Holloway
Building Program
There has been no appropriation of funds under the above since 1935.
Other Agencies
Legislature has created a state school-building act.
There is a state school-building account.
State school-building commission for each district.
Plans approved by state board of education and commission.
Buildings built by commission.
Construction supervised by commission.
Board of health has to approve drinking water and sewage disposal.

Florida

State Board of Education, Tallahassee
Prescribes rules and regulations and minimum standards in the field.
State Superintendent of Public Instruction, Colin English
Has oversight, charge, and management of all matters pertaining to public schools, school buildings and grounds.
The state department renders the following services:
1. In cooperation with county boards of public instruction, carries on surveys to determine where elementary and secondary school centers should be located, the steps that should be taken in carrying out the building program, and the means of financing the building program.
2. All capital outlay projects are submitted along with the annual school budget. Advice is rendered in connection with these proposals.
3. All plans for school buildings to be constructed are submitted to the department for approval. When necessary, recommendations are given relating to desirable improvements in the plans.
4. Plans are prepared for some of the buildings where architectural services are not available. Consultative and advisory services relating to the letting of contracts and other problems involved in the planning and construction of school buildings are provided through this department.

Director of Administration and Finance, Edgar L. Morphet
Has direction of Division, which includes work in surveys, transportation, school plant planning, and architectural service.
School Plant Planning Service, J. L. Graham
School Architect, James A. Stripling
School Surveys and Transportation, T. George Walker

Georgia

State Superintendent of Schools, Dr. M. D. Collins, Atlanta
Furnishes plans and specifications for school-building guidance in local units.
Supervisor of schoolhouse construction prepares plans for 1- to 6-teacher buildings; prepares school ground plans; checks architects' plans; advises school officials.
Other Agencies
County superintendent and county board of education approve plans.

Idaho

State Board of Education, Boise
Issues plans for 1-, 2-, 3-room buildings.
Requires approval of all plans.
State Superintendent, C. E. Roberts
Member of state board of education and its executive officer.
Other Agencies
Department of public welfare has to cooperate with state board of education in its duties regarding schools.
County superintendent has power to require local trustees to conform to rules of state board "if there is money enough."
County board of health is responsible for sanitation in schools.

Illinois

State Superintendent of Public Instruction, John A. Wieland, Springfield
Prepares, with advice of state board of health, state architect, and state fire marshal, specifications for minimum requirements in heating, ventilation, lighting, seating, water supply, toilets, safety against fire.
These have force of law.
Other Agencies
State architect is required to assist the state superintendent of schools.
Enforcement of law is in the hands of county superintendents and local authorities.
County superintendent advises school officials in details of construction, but only on standards is it necessary to follow him.
County superintendent inspects buildings.
Board of directors and board of education required to submit plans to county superintendent.

Indiana

State Superintendent of Public Instruction, Floyd I. McMurray, Indianapolis
Other Agencies
Local school trustees erect buildings. Plans and specifications must be submitted to state board of health for approval of sanitation and hygiene; to state board of accounts for adequacy of specifications and fair competition; and to state fire marshal for compliance with state fire laws.
State board of health issues standards.

Iowa

State Superintendent of Public Instruction, Jessie M. Parker, Des Moines
Shall prepare and publish, when deemed necessary, a pamphlet containing suitable plans and specifications.

Kansas

State Board of Education, Topeka
"No provision in the laws to prevent the erection of undesirable buildings or to compel the discontinuance of buildings that should be abolished immediately, further than plans for all new school buildings must be submitted to the state architect as to provision for fire protection according to law." Section 367, Revised School Laws of Kansas for 1937.
Has adopted standardization of rural schools involving among other things: out-building; school-building equipment; and the school building itself.
State Superintendent of Public Instruction, Geo. L. McClenny
Criticizes and approves plans submitted voluntarily by local authorities.
State Architect, Roy W. Stookey

Kentucky

State Board of Education, Frankfort
Authorized to approve and adopt regulations for the sanitary and protective construction of public school buildings.
State Superintendent of Public Instruction, John W. Brooker
With concurrence of state board of health prepares regulations for the sanitary and protective construction of public school buildings. Prepares plans and specifications for 1- to 4-teacher public school buildings, for adoption by the state board of education. Examines and approves or disapproves plans and specifications submitted by county boards of education and graded boards of education.

Louisiana

State Superintendent of Public Education, John E. Coxe, Baton Rouge
The state law requires approval of all school plans by the state superintendent. Plans must be drawn by licensed school architects.
Other Agencies
The state law requires that the school plans shall be approved by the state board of health, fire marshal, and parish school board.

Maine

State Commissioner of Education, Bertram E. Packard, Augusta
No school building can be built or repaired without his approval, where the expenditure is in excess of $500.
Provides plans for 1- to 4-room buildings free of cost.
Issues minimum requirements so that local units will be able to meet his approval of plans.

Other Agencies
No school building can be built or repaired without approval of board of health, where the expenditure is in excess of $500.

Maryland

State Board of Education, Baltimore
Elementary schools. Standardization includes grounds, buildings, lighting, heating and ventilation, library, equipment.
Has issued "Standards for School Buildings" as a guide to county superintendents.
State Superintendent of Schools, Dr. Albert S. Cook
Sites and plans for buildings and additions must be submitted to him for approval.
After plans have been approved by the state consultant architect, the state superintendent issues certificate without which no building costing $300 or more may be erected (Sec. 30, Article 77, Annotated Code of Maryland).
Other Agencies
Plans must be submitted to state board of health for approval of sewage-disposal arrangements and plumbing.

Massachusetts

State Department of Education, Boston
Acts in an advisory rather than supervisory capacity.
State Commissioner of Education, Walter F. Downey
Assistants of superintendent do much in consulting with local committees. Loan slides.
Other Agencies
Department of Public Works issues school-bus regulations.
Department of Public Safety issues regulations.
Department of Mental Health (through clinics, examines children who are retarded in mental development).
Department of Public Welfare (social worker visits physically handicapped children and submits recommendation as to home instruction).
Department of Public Health co-operates in preparation of forms for test cards, blanks, etc., for physical examination of school children.
Director of Buildings' Inspection Division, Department of Public Safety, George C. Parsons, 3 Hancock St., Boston

Michigan

State Department of Public Instruction, Lansing
Provides consultation to boards of education and school administrators regarding surveys, legal procedures, finance, and educational designing.
Assists in planning and executing building program, upon invitation.
State Superintendent, Eugene B. Elliott
Other Agencies
State fire marshal cooperates for elimination of fire hazards.
State department of health cooperates for provision of proper sanitation.
Public debt commission assists in problems of debt service.

Minnesota

State Board of Education, St. Paul
Prints and distributes laws and rules governing public school buildings and sites.
Supplies inspection service and advises local school officials relative to school building problems in heating, ventilation, illumination, alteration, operation, maintenance, and financing.
Assists architects and public school officials in functional planning of school buildings.
Prepares and supplies gratis to school boards plans and specifications for one and two room school houses.
Examines all plans and specifications with power of approval or otherwise.
Prescribes rules for schoolhouse construction, including therein rules of the board of health relative to sanitary standards for toilets, water-supply, and disposal of sewage.
May condemn school buildings and sites unfit or unsafe for use as such.
State Commissioner, Harry E. Flynn, Acting
Other Agencies
Division of sanitation, state board of health, examines and approves all school-building plans relative to water supply, sewage disposal and plumbing systems.
The law authorizes county superintendent to advise rural school boards in regard to buildings, ventilation, and school grounds.
Director, Division of Buildings and Business Administration, I. O. Friswold.

Mississippi

State Department of Education, Jackson
Has a division of school building service. This division:
Cooperates in making surveys on the effective organization of schools.
Makes surveys to determine building needs.
Outlines building programs.
Approves architects' plans and specifications for school buildings.
Furnishes free plans and specifications for some small school buildings, teachers' homes and accessory buildings.
General advisory service on school-plant planning and equipment and on the effective use of the school plant.
State Superintendent, J. S. Vandiver
School Building Service, W. G. Eckles, State Director

Missouri

State Superintendent of Education, Jefferson City
Provides standards for schoolhouse planning, provides plans for one-, two-, and three-room buildings, makes surveys and sets up educational specifications for buildings to be erected, checks and approves plans and specifications, also contracts let, provides school-building insurance surveys, and maintains a state-wide system of janitorial training schools.
State Superintendent of Public Schools, Lloyd W. King
Other Agencies
The State Department of Public Health aids in checking the water supply.
Director of School Building Service, N. E. Viles

Montana

State Board of Education, Helena
Publishes a bulletin containing a list of standards for rating 1- and 2-room schools.
State Superintendent of Public Instruction, Elizabeth Ireland
Plans are furnished local boards by the board of health.

Nebraska

State Superintendent of Public Instruction, Charles W. Taylor, Lincoln
Advises with school authorities regarding building programs when officials request conferences. The state department does not maintain technically trained people for this service, and Nebraska has no law requiring construction according to specifications.

Nevada

State Board of Education, Carson City
Must prepare plans and specifications for rural schoolhouses on standard lines of school architecture as to size, lighting, heating, ventilation and general sanitation. The trustees of rural schools needing new schoolhouses shall be supplied with such plans and specifications upon request.
No public schoolhouse may be erected in any school district until the plans have been approved by the deputy superintendent of public instruction.
State Superintendent of Public Instruction, Miss Mildred Bray

New Hampshire

State Board of Education, Concord
State Commissioner, James N. Pringle, Executive Secretary of State Board of Education
Interprets meaning of "suitable and sanitary" buildings for all schools. Has general authority to make regulations. Cooperates with superintendents and local school boards in planning buildings.
Recommends to state board of health investigation of unsuitable buildings.
Administrative Field Agent, Paul E. Farnum
Other Agencies
State board of health, on complaint, may condemn or order buildings improved at expense of districts.

New Jersey

State Board of Education, Trenton
Advice and consent to appointment of building inspector by commissioner of education.
Approves plans and specifications for all schoolhouse construction.
Has set up a school building code.
State Commissioner of Education, Dr. Charles H. Elliott
Appoints an inspector of school buildings, with advice and consent of state board of education.
May instruct county and city superintendents as to constructing schoolhouses and furnishing them.
Inspector of School Buildings, Seymour Williams
Recommends approval of plans and specifications for schoolhouse construction.
Inspects all new construction and old buildings.
Advises local school officials on school building needs.
Assists in school building surveys.

Other Agencies

County superintendent has power to inspect the condition of schoolhouses, sites, etc., and to advise with local boards in respect to construction, heating and ventilation, and lighting. May, with consent of commissioner of education, cause state moneys to be withheld where facilities are not in accord with legal requirements. Rules of the State Board of Education require the county superintendent to make periodic reports to the Commissioner of Education on the condition of buildings.

Local boards provide school buildings.

New Mexico

State Board of Education, Santa Fe

Approves minimum building standards to be followed by the director in charge of approval for all school building plans.

Gives official approval to proposed bond issues.

Other Agencies

State health officials make reports to the education department whenever undesirable health conditions are discovered.

State Superintendent of Public Instruction, Mrs. Grace J. Corrigan

Director, Division of Instruction in Charge of Building Plans Approval, L. W. Clark

New York

State Education Department, Albany

Has a division of school buildings and grounds with a director.

Has set up standards.

Board issues a pamphlet of information for local authorities.

Makes inspections of sites and school conditions before definite action is taken by local authority.

Advises with superintendents, principals, and boards in regard to needs and best way to meet them.

Examines preliminary plans.

State Commissioner, Dr. Ernest E. Cole

All plans and specifications must receive the commissioner's approval in all districts other than first and second class cities.

He cannot approve unless plans conform to laws.

No tax can be levied until plans are approved.

Director of School Buildings and Grounds Division, Gilbert L. Van Auken

North Carolina

State Board of Education, Raleigh

Has a division of schoolhouse planning.

There is a Literary Loan Fund from which loans are made when plans are approved.

Suggestions for planning school plants are distributed from time to time by state department of public instruction.

Has plans for one-story schools and gymnasiums which are distributed free by director of schoolhouse planning.

State Superintendent of Public Instruction, Clyde A. Erwin

Law requires that all plans be approved by state superintendent of public instruction.

Other Agencies

State insurance commissioner for fire safety, and state board of health for sanitary facilities.

Director, Division of Schoolhouse Planning, W. F. Credle

North Dakota

State Superintendent of Public Instruction, Arthur E. Thompson, Bismarck

Plans must be submitted to and approved by superintendent.

Ohio

State Director of Education, E. N. Dietrich, Columbus

Other Agencies

Has a state building code (very elaborate).

All plans must be approved by chief inspector of workshops and factories, except in cities having regularly organized building inspection departments.

District health commissioner checks plans for water-supply and sanitary arrangements. State department of health may make surveys and issue orders as to these matters.

Oklahoma

State Superintendent of Public Instruction, A. L. Crable, Oklahoma City

Prepares complete plans and specifications when requested for the construction of school buildings for four teachers or less, costing less than $10,000.

Makes school-building survey for all sizes of buildings.

Approves plans of all sizes but approval is not required by law.

Other Agencies

Standard building laws.

Book of 300 plans in hands of each county superintendent in the state.

Director of Schoolhouse Planning, Frank Williams

Oregon

State Superintendent of Public Instruction, Rex Putnam, Salem

Manual on "The Construction and Care of School Buildings" issued to all school districts. No legal provision for the approval of the state department, but an advisory service is maintained.

Other Agencies

Plans for schools in third-class districts must be approved by county school superintendents.

County superintendents advise with the school boards relative to the construction, warming, ventilating, and arrangement of schoolhouses.

All schools are examined periodically by representatives from the State Department of Education and county school superintendents.

All buildings are inspected periodically by the State Fire Marshal.

Pennsylvania

State Department of Public Instruction, Harrisburg

Has a division of school buildings.

Prescribes rules and regulations and makes such recommendations as it may deem expedient to promote physical and moral welfare of school children.

Department code—

Required to approve plans in 2nd, 3rd, 4th class districts.

Supervises preparation of plans in local communities.

Submits suggestive sketches.

State Superintendent of Public Instruction, Dr. Francis B. Haas

Other Agencies

State code.

Art commission passes on architectural design.

Department of labor and industry passes on fire and panic protection.

Chief, Division of School Plant, Dr. HuBert C. Eicher

Rhode Island

State Director of Education, James F. Rockett, Providence

Part of the income of the permanent school fund may be apportioned by the director of education to assist towns in constructing model school buildings.

South Carolina

State Superintendent of Education, Dr. James H. Hope, Columbia

Division of schoolhouse planning and construction. Plans must be submitted to and approved by the director of schoolhouse planning.

The director inspects all plans and new buildings, and a certificate of approval is necessary before they can be used.

Plans and specifications and supervision of construction are furnished to small schools not employing an architect.

Other Agencies

Has a state building code.

Director of Schoolhouse Planning, S. P. Clemons

South Dakota

State Superintendent of Public Instruction, J. F. Hines, Pierre

Plans must be approved by him, and show heating and ventilation scheme. He assists in an advisory capacity in the planning of school buildings; he also helps boards in various ways to show their communities the needs of new buildings and additions to buildings.

Tennessee

State Commissioner of Education, B. O. Duggan, Nashville

Division of schoolhouse planning furnishes working drawings and specifications for buildings up to and including four-teacher buildings. The division offers functional planning advice, and checks plans for larger buildings, where such service is requested.

State Director of Schoolhouse Planning, H. C. Headdon

Texas

State Board of Education, Austin

Purchases school district bonds or grants waiver for district to sell in open market.

State Superintendent, L. A. Woods

Administrative officer of public school laws and ex-officio secretary of the state board, receives reports required by statute and is general superintendent of business relating to the public schools.

Other Agencies

School-building code.

Plans must be submitted as follows for approval: (1) in a common school district—to the county superintendent; (2) independent district and city or town—to superintendent of schools.
These agencies report to state department what they have done and transmit evidence.
State Director of School Plant Division, J. Fred Horn
Prepares plans for 1- to 6-teacher buildings, and suggestive sketches for larger buildings; advises school officials; checks architects' plans; makes school-building surveys upon invitation; visits local units upon invitation.

Utah

State Board of Education, Salt Lake City
There are two department building codes.
First is in abeyance though not exactly discarded.
They have operated under the second one 7 years.
State Superintendent of Public Instruction, Charles H. Skidmore
Where the expenditure is in excess of $5,000, his approval of plans and specifications is required before construction may be undertaken.
Is required to formulate a code to govern preparation of plans by local communities.
May hire an architect to examine plans or inspect buildings and where necessary shall make recommendations for conformity to code.

Vermont

State Department of Education, Montpelier
Public school buildings are standardized with "points" on buildings, grounds, equipment.
Plans "should be" submitted to state department.
Issues plans, pictures and bulletins.
Employs a full-time draftsman to prepare plans and specifications for rural communities without charge.
Provides for follow-up work during the period of construction.
State Commissioner, Ralph E. Noble
Other Agencies
Plans "must be" submitted to board of health.

Virginia

State Board of Education, Richmond
Has a division of school buildings.
Prepares plans and specifications for school divisions on request.
Supervises construction free of charge.
Minimum standards have been set up and approved.
Cooperates with local boards in:
(a) Long-range studies of school building programs.
(b) Preparing preliminary plans and estimates.
(c) Developing working drawings and specifications and landscaping plans.
(d) Attendance at openings of proposals.
(e) Supervision of construction, including periodic inspections.
State Superintendent of Public Instruction, Sidney B. Hall
State Director, Division of School Buildings, Raymond V. Long

Washington

State Superintendent of Public Instruction, Olympia
Has been given "some power" through law on "wider use of school plant."
State Superintendent of Public Instruction, Stanley F. Atwood
Other Agencies
County superintendents approve plans in 3rd class districts.

West Virginia

State Board of Education, Charleston
May require all plans and specifications for the erection of school buildings to comply with the requirements of law; and may require all county boards to submit all plans and specifications for the state board's approval.
Plans and specifications are approved by the State Board of Education in accordance with the Board's order.
State Superintendent of Free Schools, W. W. Trent

Wisconsin

State Department of Public Instruction, Madison
Under a cooperative agreement between the industrial commission and the department, all school plans are sent to the latter by the commission for checking and suggestive criticisms looking towards the erection of first-class buildings.
Helps local communities by suggesting plans for all types of buildings to serve as a basis for extended work by commercial architects.
Service has been extended to cover expert advice on heating, ventilation, lighting.
The department develops complete plans and specifications and gives architectural service for 1- and 2-room rural schools on request.
Inspects all types of schools with a view to improving housing conditions and facilities; makes complete building surveys in all types of communities on request.
Gives field service and makes inspection upon request.
Cooperates with all state agencies which have partial jurisdiction (through codes) over school buildings.
State Superintendent of Public Instruction, John Callahan
Other Agencies
The law requires submission of all school plans to industrial commission. This checking refers primarily to the application of the state building code and pays attention primarily to construction, safety and sanitation.
Supervisor of School Building Service, H. W. Schmidt

Wyoming

State Superintendent of Public Instruction, Esther L. Anderson, Cheyenne
Entrusted with general supervision of the public schools of the state.
Commissioner of Education, Ray E. Robertson
He shall prepare for the use and guidance of the district board regulations and suggestions for standardizing and grading schools and for the hygienic and sanitary building of schoolhouses and the selection of sites.

ARCHITECTS FOR EDUCATIONAL BUILDINGS

(Continued from page 171)

El Paso
Frazer & Benner, El Paso National Bank Bldg.
Percy Wear McGhee, F. N. B. Bldg.
Gilbert G. Satrong, First National Bank Bldg.
Trost & Trost, El Paso National Bank Bldg.

Fort Worth
Adam A. Bliss, Flat Iron Bldg.
W. G. Clarkson & Co., First National Bank Bldg.
Hubert Hammond Crane, Camp Bowie Blvd.
Preston M. Geren, 806½ Burnett St.
Earl T. Glasgow, Insurance Bldg.
Wyatt C. Hedrick, Inc., First National Bank Bldg.
C. M. Love & Co., 314 S. Henderson St.
M. M. Moseley, 4223 Pershing St.
Joseph R. Pelich, Trinity Bldg.
Elmer G. Withers Architectural Co., Inc., Lucerne Apt.

Galveston
Ben Milam, Trust Bldg.

Georgetown
L. L. Huie, Box 125

Henderson
J. L. Downing, First National Bank

Houston
Cameron Fairchild, Houston Merchants Exchange Bldg.
Alfred C. Finn, Bankers Mortgage Bldg.
John L. Hannon, 4014 Garrott St.
Hedrick & Lindsley, Inc., So. Standard Bldg.
Heidbreder & Bush, 6502 Stratton St.
Henry F. Jonas & Tabor, Union National Bank Bldg.
Joseph W. Northrop, Jr., 3940 Main St.
Stayton Nunn—Milton McGinty, 2017 W. Gray St.
Harry D. Payne, 3908 Main St.
R. G. Schneider & Co., Inc., Republic Bldg.
Henry Aam Stubee, 5009 Fannin St.
Maurice J. Sullivan, 3901 Travis St.
Wm. Ward Watkin, 5009 Caroline Blvd.
Wirtz, Calhoun & Willaver, 500 Stuart Ave.

Jasper
W. C. Meador, Box 603

Laredo
Trout & Leyendecker, Valls Bldg.

Livingston
Emory S. White, First National Bldg.

Longview
N. L. Peters, Box 1866

Lubbock
Butler-Huseman Co., Box 418
Herman L. Fink, 1111 Ave N
Haynes & Strange, Myrick Bldg.
O. R. Walker, Palace Theatre Bldg.

Lufkin
Kent & Coston

Palestine
T. Brook Dougherty, 201½ N. Spring St.
O. L. Hazelwood, Link Bldg.
Theo. S. Maffitt, 510 N. Sycamore St.

Paris
Will H. Lightfoot
Edwin R. Smith, S. Main St.

Rosenburg
Ernest L. Shult

San Angelo
John G. Becker
L. H. Gaskins, 503 N. Monroe St.
Leonard R. Mauldin & Max D. Lovett, 111 W. Beauregard St.

San Antonio
Adams & Adams, Gunter Bldg.
Atlee B. & Robert M. Ayres, Smith-Young Tower
Leo M. J. Dielmann, 145 North St.
Marvin Eickenroht, Maverick Bldg.
Jno. M. Marriott, Frost Bank Bldg.
Will N. Noonan, Builders Exchange Bldg.
Henry T. Phelps, Smith-Young Tower

Sweetwater
Don W. Smith, Doscher Bldg.

Tyler
Gregory & Cates, Gary Bldg.
Birch D. Easterwood & Son, Liberty Bldg.

Weslaco
R. Newell Waters, 118 E. 5th St.

Wichita Falls
Voelcker & Dixon, Inc., 913½ Indiana St.

Utah

Logan
Karl C. Schaub & Son, Arimo Bldg.

Ogden
Leslie S. Hodgson, Eccles Bldg.
Eber F. Piers, 2726 Harrison Blvd.

Provo
Claude Shepherd Ashworth, 44 W. 2nd St., N.
Joseph Nelson, 135 E. Center St.

Salt Lake City
Ashton & Evans, Beneficial Life Bldg.
Cannon & Mullen, Templeton Bldg.
Fetzer & Fetzer, Templeton Bldg.
L. L. Howenstine, 849 S. 11th, E.
Niels P. Larsen, 68 S. Main St.
Miles E. Miller, Felt Bldg.
Carl W. Scott, Dooly Bldg.
Ware & McClenahan, Utah Savings & Trust Bldg.
Lorenzo S. Young, Continental Bank Bldg.

Vermont

Burlington
Austin & Austin, 246 College St.

Virginia

Arlington
Mims, Speake & Company, 3150 Wilson Blvd.

Charlottesville
S. J. Makielski, Barracks Road

Lynchburg
Pendleton S. Clark, Krise Bldg.
Hinnant & Smith, Peoples Bank Bldg.

Newport News
Williams, Coile & Pipino, Melson Bldg.

Norfolk
Rudolph, Cooke & Van Leeuwen, Arcade Bldg.

Richmond
Baskerville & Son, Central Bank Bldg.
Carneal, Johnston & Wright, Atlantic Life Bldg.
C. W. Huff, Jr., 103A E. Cary St.
Raymond V. Long, State Dep't of Education
J. Binford Walford, 103 E. Cary St.
Luther E. Warner, 110 N. 7th St.
Marcellus Wright & Son, 1103 E. Main St.

Roanoke
Eubank & Caldwell, Inc., Boxley Bldg.
Randolph Frantz & John M. Thompson, Boxley Bldg.
Frank F. Stone, 110½ W. Church Ave.
Smithey & Boynton, 112 W. Kirk Ave.

Washington

Bellingham
F. Stanley Piper, Herald Bldg.
Wohleb & Stanton, Herald Bldg.

Bremerton
B. H. & K. G. Branch, Wallace Bldg.

Longview
Ray V. Weatherby, Henry Bldg.

Olympia
Jos. H. Wohleb, Chambers Bldg.

Pullman
Stanley A. Smith, State College of Washington

Seattle
Charles H. Bebb & John Paul Jones, Hoge Bldg.
Graham & Painter, Dexter Horton Bldg.
William Mallis, Lyon Bldg.
Earl W. Morrison, Textile Tower
Naramore & Brady, Central Bldg.
Fred B. Stephen, Smith Tower
James M. Taylor, Jr., Textile Tower
Arch N. Torbitt, Lloyd Bldg.

Spokane
Henry C. Bertelsen, Empire State Bldg.
Miller & Hovind, Old National Bank Bldg.
G. A. Pehrson, Old National Bank Bldg.
George M. Rasque & Son, Washington Trust Bank Bldg.
Rigg & Vantyne, Peyton Bldg.
Whitehouse & Price, Hutton Bldg.

Tacoma
E. J. Bresemann, Perkins Bldg.
W. W. Durham, Box 1357
Mock & Morrison, Perkins Bldg.
Chas. V. Rueger, Puget Sound Bank Bldg.
Sutton, Whitney & Dugan, Rust Bldg.

Vancouver
Donald J. Stewart, Central Bldg.

Wenatchee
L. Solberg, Widby Bldg.

Yakima
John W. Maloney, Larson Bldg.
Walter H. Rothe, Liberty Bldg.

West Virginia

Bluefield
Garry & Sheffey, Appalachian Bldg.
Alex B. Mahood, Law & Commerce Bldg.

Charleston
Herbert S. Kyle, Union Trust Bldg.
Walter F. Martens, Chamber of Commerce Bldg.
Meanor & Handloser, Inc., Payne Bldg.—Lee St.
Tucker & Silling, Masonic Bldg.

Clarksburg
Edward J. Wood & Son, Associates, Lowndes Bldg.

Fairmont
L. D. Schmidt, Professional Bldg.

Huntington
Levi J. Dean, 2748 Guyan Ave.
Frampton & Bowers, 412 11th St.

Welch
Hassell T. Hicks

Wellsburg
R. W. Whitehead, Banking & Trust Bldg.

Wheeling
Frederick Faris, 1117 Chapline St.

Wisconsin

Appleton
Raymond N. LeVee, 315 W. College Ave.
Lytle & Smith, 112 W. College Ave.
Edward A. Wettengel, 116 S. Pierce Ave.

Boscobel
Joseph G. Durrant

Eau Claire
Klinger & Hubbard, Culver Bldg.
Howard M. Nelson, S. A. F. Bldg.

Fond du Lac
J. E. Hennen, 116 S. Mail St.
F. J. Stepnoski & Son, 104 S. Main St.

Green Bay
Gordon Feldhausen, Columbus Club Office Bldg.
Foeller, Schober, Berners, Safford & Jahn, 310 Pine St.
Levi A. Geniesse, 226 N. Washington St.
Oppenhamer & Obel, 110 S. Washington St. (also in Wausau)

La Crosse
Boyum, Schubert & Sorenson, Hoeschler Bldg. (also in Winona, Minn.)
Nelson & Fuchs, 115 S. 4th St.
Parkinson & Dockendorff, Linker Bldg.

Madison
Beatty & Strang, 610 State St.
John J. Flad & Thomas H. Flad, Associates, 133 Langdon St.
Law, Law & Potter, 1 S. Pinckney St.
Frank Riley & Lewis Siberz, 103 W. Mifflin St.
Starck, Sheldon & Schneider, Inc.
Edward Tough, Washington Bldg.

Manitowoc
Percy Brandt, Dempsey Bldg.

Marinette
Max Hanisch, Stephenson Block

Marshfield
Gus. A. Krasin, 202½ S. Central Ave.

Milwaukee
E. Brielmaier & Sons Co., 735 N. Water St.
Brust & Brust, 135 W. Wells St.
Clas & Clas, Inc., 759 N. Milwaukee St.
Gerrit J. deGelleke, 152 W. Wisconsin Ave.
Ebling & Plunkett, 739 N. Broadway
Eschweiler & Eschweiler, 720 E. Mason St.
Herbst & Kuenzli, 1249 N. Franklin Pl.
Lindl, Schuette & Lefebvre, 709 N. 11th St.
R. A. Messmer & Bro., 231 W. Wisconsin Ave.
William H. Mitterhausen, 2137 N. 55th St.
R. E. Oberst, 2659 N. 27th St.
Richard Philipp, 756 N. Milwaukee St.
Alfred H. Siewert, 2309 N. 36th St.
Roger A. Sutherland, 259 E. Wells St.
John Topzant, 424 E. Wells St.
Guy E. Wiley, 2213 N. 34th St.

Monroe
Stanley W. Howe, 1518 11th St.

Oshkosh
Auler, Jensen & Brown, E. R. A. Bldg.

Racine
J. Mandor Matson, Baker Block (also in La Crosse)

Sheboygan
Edgar A. Stubenrauch, 708 Erie Ave.

Superior
Roland C. Buck, Inc., Telegram Bldg.

Two Rivers
Sylvester Schmitt, Bank Bldg.

Wausau
Donn Hougen, Box 809 (also at 132 E. Grand Ave., Wisconsin Rapids)
Oppenhamer & Obel, 610½ Third St. (also in Green Bay)

Wauwautosa
Mark F. Pfaller, 8525 Ravenswood Circle
Slaby & Keymar, 2209A N. 69th St.
Chas. F. Smith, 717 N. 65th St.

Wisconsin Rapids
A. F. Billmeyer & Son, 172 2nd St.

Wyoming

Casper
Goodrich & Krusmark

Cheyenne
Paul Atchison, 301 E. 21st St.
William DuBois, 1810 Capitol Ave. (also in Laramie)
Frederick H. Porter, 211 W. 19th St.

Laramie
Wm. Dubois & Fred W. Ambrose, Box 376 (also in Cheyenne)
G. C. Hollo, 208 Grand Ave.

Alaska

Juneau
N. Lester Troast & Associates, Shattuck Bldg.

Hawaii

Honolulu
C. W. Dickey, Damon Bldg.
Guy N. Rothwell, Damon Bldg.
Hart Wood & Arthur J. Russell, 2512 Manoa Road.
John Mason Young, Box 638

Philippines

Manila
Juan F. Nakpil, 611-615 Dakota St.

Puerto Rico

Santurce
Rafael Carmoega, Box 3007

Canada

Calgary, Alta.
W. A. Branton, Calgary School Board,

Montreal, Que.
Gaston Gagnier, 308 Ste. Catherine St., E.
Henri S. Labelle, 3 Kelvin Ave., Outremont
Joseph Sawyer, Guy St., 1207

Ottawa, Ont.
Lucien Leblanc, 100 George St.

Quebec, Que.
Amyot, Bouchard & Rinfret, 105 Mountain Hill
Pierre Levesque, 115 St. John St.

Regina, Sask.
W. G. Van Egmund, Stan. E. Storey, McCallum Hill Bldg.
J. H. Puntin, 2059 Elphinstone St.

St. John, N. B.
H. Claire Mott, 13 Germain St.

Sherbrooke, Que.
Louis N. Audet, 32 Wellington St., N.

Sudbury, Ont.
P. J. O'Gorman, 4 Durham St.

Thetfordmines, Que.
J. Berchmans Gagnon, 326 Notre Dame St.

Toronto, Ont.
S. B. Coon & Son, 4 St. Thomas St.
Forsey, Page & Steele, 20 St. Clair Ave., W.
Marani, Lawson & Morris, 46 Bloor St., W.
Mathers & Haldenby, 96 Bloor St., W.

Vancouver, B. C.
Harold Cullerne, 325 Howe St.
H. W. Postle, Board of School Trustees, Hamilton & Dunsmuir Sts.
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ARCH-RIB FLOORS, INC.

103 Park Avenue

New York

ARCH-RIB FLOORS—FIREPROOF—LOW COST

The **Arch-Rib** Floor System is the modern answer for low-cost reinforced concrete **floors and roofs** for the up-to-date fireproof school building.

Arch-Rib construction is classified by the New York Fire Insurance Exchange as "full fire resistive (fireproof)" and given a four-hour rating.

Building authorities approve **Arch-Rib.** Designed according to standard engineering practice as a T-beam section.

Fireproof Construction at the Cost of Wood

For the completed building, in practically every case savings created by the use of **Arch-Rib make the final cost equal to that of wood floors and roofs.**

Arch-Rib Construction

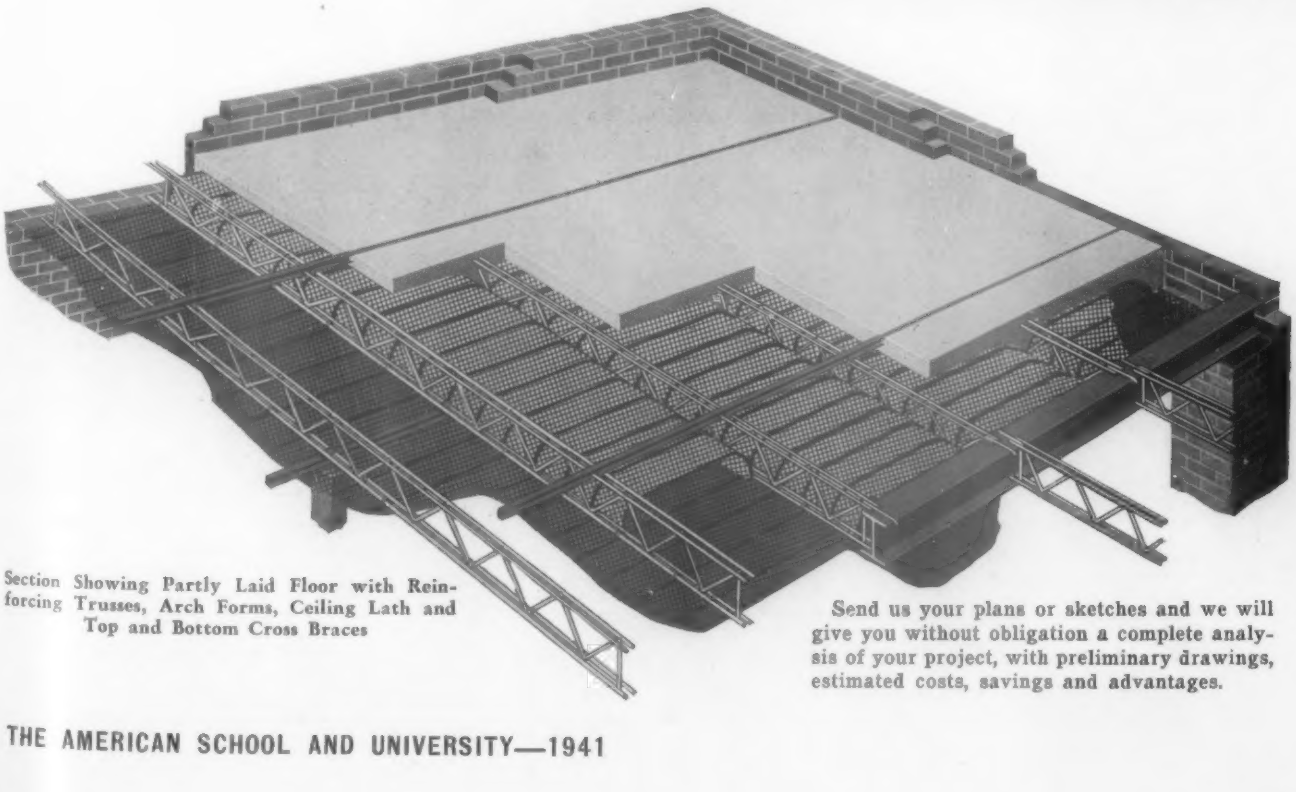
As illustrated, **Arch-Rib** Construction consists of a two-inch concrete slab integral with supporting concrete T-beams, or ribs, spaced every 24 inches. Ribs are reinforced with open web steel trusses from the lower chord of which the metal ceiling lath is suspended ¾ inch by hooks. Arch forms resting on the ceiling lath serve as support for the arches between the ribs and eliminate the need of other forms. When the concrete is poured, the floor slab and beams are monolithic and the area inside the arch forms is available for electric wiring, accessories, heating ducts and plumbing systems.

Advantages of Arch-Rib Construction for Schools and Other Buildings

1. Low cost
2. Full fireproof
3. Minimum insurance rates
4. Light in weight, long spans
5. Low depreciation and upkeep
6. Economically and quickly installed
7. No shrinkage, prevents plaster cracks
8. Verminproof, ratproof and termiteproof
9. Any floor surface may be used over Arch-Rib
10. Sound insulative, providing quiet class rooms
11. Valuable insulation, warmer in winter, cooler in summer
12. All utilities—electric wiring, plumbing, easily installed

FOR FULL DETAILS AND INSTALLATION COST WRITE US, OR SEE OUR CATALOG IN SWEET'S.

Section Showing General Construction of Arch-Rib Concrete Floor System



Section Showing Partly Laid Floor with Reinforcing Trusses, Arch Forms, Ceiling Lath and Top and Bottom Cross Braces

Send us your plans or sketches and we will give you without obligation a complete analysis of your project, with preliminary drawings, estimated costs, savings and advantages.

BLACKBOARD RESURFACING, INC.

5209 Euclid Avenue, Cleveland, Ohio

BEFORE

AFTER

THE STATLER METHOD OF BLACKBOARD RESURFACING

If any of your classroom blackboards have become gray and unsightly from deterioration due to age or improper cleaning, or both—

Or if they are covered with blotches—

Of if they are black, but reflecting excess glare due to the fact that they were refinished with some stain or varnish—

We invite you to ask our representative in your vicinity to demonstrate to you the new **Statler Method of Blackboard Resurfacing,** which restores to slate blackboards their original smooth, black, non-glare surface.

The Statler patented process does the job of resurfacing quickly, economically, without upsetting school routine—restoring the investment in your slate blackboards to full value for only a fraction of the cost of new boards.

The process is almost one hundred per cent noiseless and dustless. It is not necessary to buy the machine. In fact, the machines are not for sale. We furnish the equipment and the workmen. All glaze, discoloration, impregnation of chalk binder, and surface deterioration caused by long usage, or by washing with water, are removed. The result is a smooth, clean, black surface, the color being restored as closely as possible to the natural blackness of the slate. No stains or surface applications of liquids are employed. If any pits or small holes exist in the surface of a board, these are removed by grinding the surface back sufficiently to eliminate the unevenness, provided this, in the estimate of our workman, will not weaken the board.

Let Blackboard Resurfacing, Inc., make your blackboards 100 per cent efficient. The low reflection factor of the finished boards, combined with high-visibility white chalk, will reduce pupils' eyestrain, and increase greatly their attentiveness and concentration!

By writing the address above, you can obtain the name and address of our representative in your locality.

THE STATLER DRY METHOD CLEANER FOR BLACKBOARDS AND ERASERS

Now that the Statler Dry Cleaning Method for blackboards and erasers has been perfected, there is no longer any need to suffer the handicap of cloudy, smudged blackboards—also no need to wash them daily with water, the agent which, in combination with the chalk dust, causes rapid deterioration of the boards.

The Statler process is a simple vacuum cleaning process. Note the man applying the long eraser to the blackboard surface, in the picture at the left. This long eraser is a **clean** eraser. He **keeps** the eraser clean, by sliding it along an opening at the top of the cleaning machine to remove the chalk dust by suction and vibration. The result of working all the time with a dry, clean eraser, is that when the job is finished, you have no grayness, no smudgy streaks. In the same way, chalk dust is quickly removed from blackboard rails and the small erasers used during the day.

This dustless, noiseless, economical, efficient method of cleaning blackboards and erasers requires about seven minutes per room, and involves the purchase at low cost of the small, portable machine shown in the picture, with long eraser, also shown.

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1441 N. Dayton St., Chicago, Ill.

Pumps, Compressors and Sewage Treatment Equipment

Est. 1898 REPRESENTATIVES IN ALL PRINCIPAL CITIES

"SIMPLETTE" SPRINKLER

FOR SMALL SEWAGE TREATMENT PLANTS

The "SIMPLETTE" Sprinkler for use in small sewage purification plants, is designed to apply settled sewage to a trickling filter with unfailing reliability and regularity.

Working in conjunction with a primary tank or other form of settling tank, it will deal with the sewage from isolated groups of houses, schools, hospitals and other institutions producing a high degree of purification.

From the illustrations, it will be seen that the Sprinkler consists of a rotating distributing arm of channel section from which the sewage is fed to the filter by a series of "V" notches and splash plates, spaced in such a manner that even distribution is assured. The rotating trough is actuated by means of bevel gearing and a waterwheel, and is supported by a box section which also conveys the sewage to the center of the rotating trough.

The "SIMPLETTE" distributor can be furnished for filter beds from 7′ to 20′ in diameter. In determining the diameter, it should be noted that as no center well for support for the distributor and for inlet pipe is required, the entire area of the bed becomes effective for filtration purposes.

Satisfactory operation is assured at all flows, for even at the lowest rates, rotation of the distributing trough takes place as the waterwheel buckets fill. FREQUENT CLOGGING AND CLEANING OF SPRAY NOZZLES IN SMALL REACTION DISTRIBUTORS ARE ELIMINATED BY THE "V" NOTCHES.

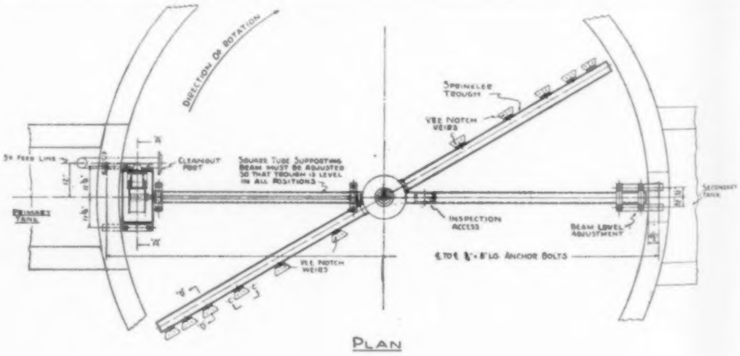
The "SIMPLETTE" Sprinkler is exceedingly robust and simple, and can be erected by any handy man. It can be relied upon to work for long periods, the amount of attention required for lubrication and cleaning being negligible.

Further details will be submitted on request

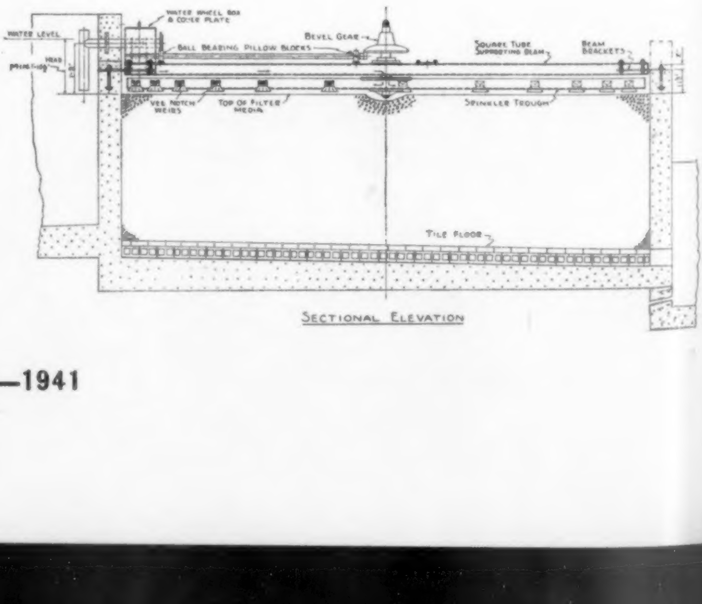
AVERAGE DRY WEATHER FLOWS HANDLED BY TRICKLING FILTERS

Filter Diameter	Flow, G.P.M.	Flow, G.P.D.	Pop. Served	Filter Diameter	Flow, G.P.M.	Flow, G.P.D.	Pop. Served
7′ 0″	1.2	1,730	24	17′ 0″	7.3	10,500	150
9′ 0″	2.	2,880	39	18′ 0″	8.2	11,800	169
11′ 0″	3.	4,320	62	19′ 0″	9.1	13,100	187
13′ 0″	4.3	6,125	83	20′ 0″	11.	15,820	226

Flow and population served are based on 70 gallons per capita per day and filter loading of 400 lbs. B. O. D. per acre foot of filter area. Greater flows and filter loadings are often allowable.



PLAN



SECTIONAL ELEVATION

"SIMPLETTE" SPECIFICATIONS

The distributor shall be of the Yeomans Simplette sewage sprinkler type built for —— diameter filter bed and driven by influent to the filter acting on a waterwheel with feed pipe from primary tank to wheel box above filter media.

The equipment shall include steel support beam with brackets, leveling screws and foundation bolts for attachment to filter bed walls, and rotating open sprinkler trough with adjustable vee-notch weirs and splash plates spaced to provide effective distribution and aeration of the settled sewage.

Speed of rotation of the sprinkler trough shall be automatically controlled to maintain correct distribution under all flow conditions.

The mechanism shall operate continuously at all flows up to a maximum of —— gallons per minute with a head of —— ft. —— in., measured from filter bed media surface to primary tank liquor level.

No dosing chamber, siphon, underground feed line, centre support, centre well or mercury seal shall be employed.

NOTE—A suitable ventilated cover over filter bed and Simplette Sprinkler is recommended where very low winter temperatures occur.

YEOMANS PNEUMATIC "EXPELSOR" SEWAGE EJECTOR

Successor to the SMALL So-Called Non-Clogging Centrifugal Sewage Pump.

To choose between any two pieces of sewage pumping equipment—particularly where the choice involves a difference of type—requires a deliberate point for point comparison of features. Hence this list, which demonstrates the advantages—the needed advantages—of Yeomans "Expelsor" Pneumatic Ejector, designed especially for the medium-to-small waste removal system.

The Yeomans "Expelsor," unlike a small centrifugal sewage pump of equal capacity:

(1) **Will pass solids up to the size of the inlet and discharge valves.**

(2) **Requires no screens, no shredders.**

(3) **Has no moving parts. Has no stuffing boxes requiring packing and exposing the attendant to pathogenic bacteria.**

(4) **Has no wet well, requiring additional excavation, form and concrete work.**

(5) **Will cause no septic action due to sewage retention, or sludge accumulation.**

(6) **It therefore does not interfere with treatment processes.**

(7) **Produces no deadly hydrogen sulphide gas, no explosive methane gas. No such gases can enter the ejectors because the inlet pipes are sealed. The ejector pots are hermetically sealed. There can be no odor nuisance, inviting complaints. The air compressor automatically ventilates the station.**

(8) **Has no floats, float rods, or other moving parts inside the ejector receiver. No float switches. No shafting or bearings in the pit. No floor over the pit for the motors.**

(9) **Should a discharge line become obstructed, there is excess air pressure to clear it.**

(10) **Accurate metering attachment available at small additional cost.**

(11) **The "Expelsor" principle has behind it an unbroken 50-year record for astonishingly dependable performance.**

"EXPELSOR" SELECTION CHART

Cap., G.P.M.	Head, Unit Number and Motor Size					
	10′	15′	20′	25′	30′	35′
30	4410-X 1 H.P.	4415-X 1 H.P.	4420-X 1 H.P.	4425-X 1½ H.P.	4430-X 1½ H.P.	4435-X 1½ H.P.
50	4510-X 2 H.P.	4515-X 2 H.P.	4520-X 2 H.P.	4525-X 3 H.P.	4530-X 3 H.P.	4535-X 3 H.P.
75	4610-X 3 H.P.	4615-X 3 H.P.	4620-X 5 H.P.	4625-X 5 H.P.	4630-X 5 H.P.	4635-X 5 H.P.
100	4710-X 5 H.P.	4715-X 5 H.P.	4720-X 5 H.P.	4725-X 5 H.P.	4730-X 7½ H.P.	4735-X 7½ H.P.

Larger sizes to order.

EASY TO APPLY

In a district containing fifty residences, or 250 population, the daily flow would be 25,000 gallons. Half of this, in eight hours, becomes 1,560 gallons per hour, or 26 G. P. M. Allowing for infiltration, a 50 G. P. M. lift station should be used.

Because of the ever-present possibility of unusual peak loads, or increase in population, it is customary to install such equipment in duplex, or at least make provision for such installation—for once installed, one seldom hears of a "lifetime" Yeomans outfit being replaced.

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Train them on MACHINES they will eventually use . . .

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TWO TYPES OF SERVICISED EXPANSION JOINTS

For Use in Both New Construction and Repair of Walls, Floors, Sidewalks and Driveways

PARA-PLASTIC COMPOUND

Servicised Para-Plastic Compound (Rubber Oil) is a product extremely elastic which is particularly recommended **wherever it is desired** to completely waterproof a crevice in concrete or stucco walls, floors, sidewalks or pavements . . . **wherever it is necessary** to have expansion and contraction provided for and yet preserve the crevice in a waterproof state between the adjacent slabs.

It is also furnished in **liquid** form for use in filling **small** crevices.

The illustration below is a photograph of two sections of concrete block approximately four inches square united by a layer of Servicised Para-Plastic Compound ⅜-inch thick. Please note in the illustration that the one section was held between cleats, allowing the other section, together with the cement, to overhang the lower cleat for a period of time at room temperature.

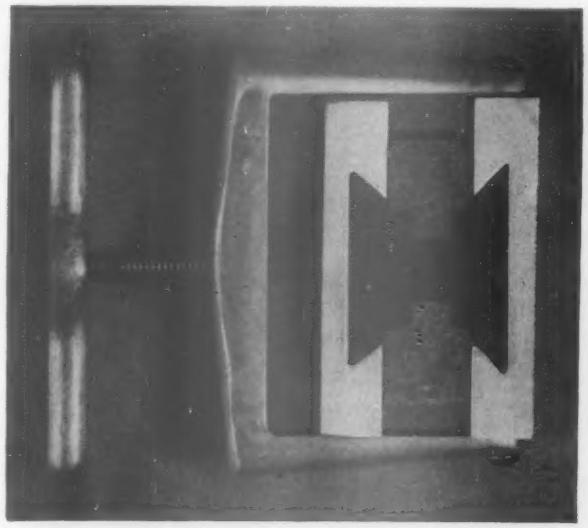
The particular feature about this illustration is the fact that the rubber oil as shown is extremely plastic and the leverage of the piece of concrete to the right did not produce sufficient strain to distort the plastic material . . . thus showing the tenacity and elasticity of the material itself, as well as its extreme adhesive qualities to the side of the concrete section.

Servicised Para-Plastic Compound is particularly resistant to temperature change, and even at temperatures approximating two hundred degrees will still retain its elasticity. It is elastic at zero ° temperature.

This material is prepared in containers and can be heated and poured, and is also furnished in sealing strips already preformed and prepared for insertion.

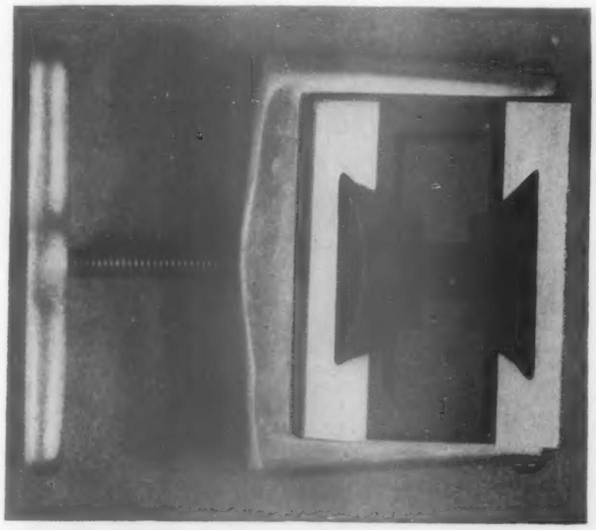
WATERSTOP EXPANSION JOINTS

Waterstop Expansion Joints are particularly recommended for **new** building construction or paving, wherever expansion and contraction must be provided for and the joint definitely sealed against moisture.



The illustration above shows a Waterstop in normal position. Expansion brings added compression. Seal is effected from slab to slab. Contraction of slabs intensifies compression of Waterstop.

The illustration below shows an extreme contraction condition:—ever-increasing flexing action; intensified pressure against housing opening, effecting tight water seal under the most severe conditions; an almost ⅜-inch play between fibre and the walls of concrete.



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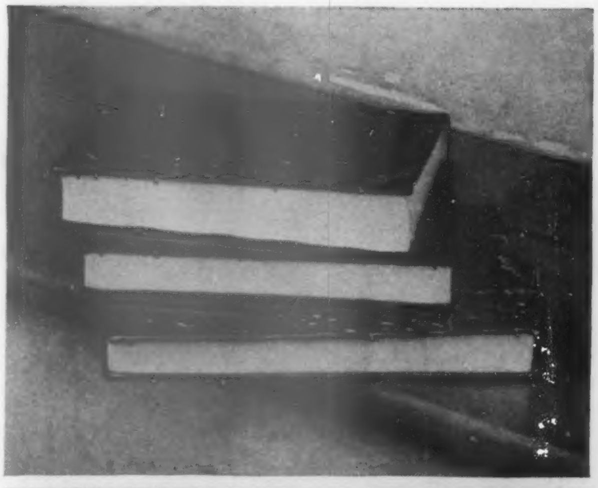

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